HS2

April 2019

Construction noise and vibration report February 2017 to August 2017

London Borough of Camden

gov.uk/hs2

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Non-technical summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden (LBC) during the months from February 2017 to August 2017.

During the reporting period HS2 preparatory works were undertaken at Network Rail worksites B, C, D, E and F. Site establishment was underway at the DB Cargo and former Addison Lee worksite (ref. S001-WS01), at St James's Gardens worksite (ref. S003-WS01) and at the former National Temperance Hospital, 110 Insull Wing worksite (ref. S003-WS02). Details of works undertaken at each worksite are presented in the report.

Noise monitoring was undertaken in the vicinity of Network Rail worksites B, D, E and F. Further noise monitoring installation in the LBC area will follow in advance of significant demolition or construction activities.

Exceedances of the SOAELs due to HS2 works were measured at some monitoring positions surrounding worksites B, D, E and F, which were caused by activities at Network Rail HS2 construction sites mainly outside core working hours. No exceedance of S61 trigger levels was measured during the monitoring period. Five noise complaints were received during the monitoring period. Description of the complaints, results of investigations and any actions taken are detailed in the report.

Abbreviations and descriptions

The abbreviations, descriptions and project terminology used within this report can be found in the Project Dictionary (HS2-HS2-PM-GDE-000-000002).

Table 1: Table of abbreviations

Terminology	Meaning
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
Equivalent continuous sound pressure level, or $L_{pAeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$.

1 Introduction

1.1.1 The nominated undertaker is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1st February 2017 to 31st August 2017.

1.1.2 Active construction sites in the local authority area during this period include:

- Network Rail on-networks HS2 preparatory works: worksite ref. B, (see plan 1 and 2 in Appendix A)
  - Works activities include deliveries, movement of material and plant, clearance and spoil removal, de-vegetation, surveys (including ground investigations, surveys of cable troughs, trial holes, signal surveys, overhead line structures survey, under track crossing surveys, topographical surveys), laying of new cables, civils works at road/rail access points, works at overhead line equipment, electrical works and cabling, permanent way works, small part steel works, cable tag and trace, cable percussion borehole and cone penetration testing, CCTV survey for drainage run, concrete pouring for cable crossing.
- Network Rail on-networks HS2 preparatory works: worksite ref. C, D, E and F (see plan 2 in Appendix A)
  - Works activities include deliveries, movement of material and plant, clearance and spoil removal, de-vegetation, surveys (including ground investigations, surveys of cable troughs, trial holes, signal surveys, overhead line structures survey, under track crossing surveys, topographical surveys), laying of new cables, civils works at road/rail access points, works at overhead line equipment, electrical works and cabling, removal of structures and foundation

at the DB Cargo shed, small part steel works, cable tag and trace, works to overhead line equipment for Up Sidings.

- DB Cargo shed and former Addison Lee, worksite ref. S001-WS01 (see plan 2 in Appendix A)
  - Works activities include site establishment.
- St James's Gardens, worksite ref. S003-WS01 (see plan 3 in Appendix A)
  - Works activities include site establishment.
- Former National Temperance Hospital, Insull Wing, worksite ref. S003-WS02 (see 3 in Appendix A)
  - Works activities include site establishment.

The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be found at the following location https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2. Noise and vibration monitoring reports can also be found at this location. Noise and vibration reports prior to 2018 can be found at the following location www.gov.uk/government/publications/monitoring-noise-and-vibration-on-the-hs2-phase-one-route.

1.2 Measurement locations

1.2.1 Table 2 summarises the position of noise and vibration monitoring installations within the LBC area from 1st February 2017 to 31st August 2017.

1.2.2 Maps showing the position of noise monitoring installations are presented in Appendix B.

Table 2: Monitoring locations.

Worksite Reference	Measurement Reference	Address
B	JC	Juniper Crescent, London, NW1 8HA
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR
E	GT	5A Granby Terrace, Kings Cross, London, NW1 3SA
F	BS	Roof of Stockbeck House, Barnby Street, Kings Cross, London, NW1 2RS

2 Summary of results

2.1 Exceedances of SOAEL

2.1.1 The significant observed adverse effect levels (SOAEL) is defined in the Planning Practice Guidance – Noise as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

2.1.2 Where construction noise levels exceed the SOAEL, relevant periods will be identified and summary statistics provided in order to evaluate ongoing qualification for noise insulation and temporary rehousing.

2.1.3 Table 3 presents a summary of recorded exceedances of the SOAEL due to HS2 related construction noise at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 3: Summary of exceedances of SOAEL.

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
B	JC (1)	Juniper Crescent, London, NW1 8HA	Saturday Sunday Night	1400-2200 0700-2200 2200-0700	7 2 49
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR	Night	2200-0700	7
E	GT	5A Granby Terrace, Kings Cross, London, NW1 3SA	Sunday Night	0700-2200 2200-0700	11 26
F	BS	Roof of Stockbeck House, Barnby Street, Kings Cross, London, NW1 2RS	Weekday Night	0800-1800 2200-0700	3 13

(1) This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.1.4 Over the reporting period the SOAEL was exceeded at a number of measurement locations in the vicinity of worksites B, D, E and F. These were caused by activities at Network Rail HS2 construction sites mainly during night-time periods and during weekend days. Outside of these times any exceedances of the SOAEL were caused by the

underlying ambient noise levels or other construction activities not related to HS2, rather than being attributable to HS2 construction noise.

2.1.5 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 4 and may be lower than the total sum of individual exceedances reported in Table 3 for each location.

Table 4: Summary of total exceedances of SOAEL.

Worksite Reference	Measurement Reference	Site Address	Total of SOAEL exceedances in the period
B	JC (1)	Juniper Crescent, London, NW1 8HA	47
D	MT	Mornington Terrace	7
E	GT	13 Mornington Terrace, Kings Cross, London, NW1 7RR	33
F	BS	5A Granby Terrace, Kings Cross, London, NW1 3SA	14

(1) This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.2 Summary of measured noise levels

2.2.1 Table 5 presents a summary of the measured noise levels at each monitoring location over the reporting period. The $L_{Aeq,T}$ is presented for each of the relevant time periods averaged over the period, along with the highest single period $L_{Aeq,T}$ that was found to occur within the period.

2.2.2 Other than during periods of out-of-hours works at HS2 on-network worksites, the measured noise levels at all locations were largely dominated by the underlying ambient noise levels, rather than being attributable to HS2 construction activities, acknowledging that intermittent HS2 works may on occasion be taking place within the area.

Table 5: Summary of measured dB L_{Aeq} data over the monitoring period.

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade measurement	Weekly Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
B	JC [1]	Juniper Crescent, London, NW1 8HA	Free-field	67.4 (71.0)	67.2 (71.7)	67.6 (71.0)	66.9 (70.9)	62.4 (74.8)	63.6 (67.9)	65.6 (71.6)	63.0 (67.4)	64.7 (70.0)	61.2 (74.6)	63.4 (70.3)	59.0 (68.5)
D	MT	13 Mornington Terrace, Kings Cross, London, NW1 7RR	Free-field	56.4 (59.9)	58.7 (66.3)	58.5 (62.2)	56.8 (61.6)	51.4 (60.4)	54.8 (57.4)	56.1 (58.2)	56.2 (56.5)	56.3 (63.0)	50.7 (56.2)	53.9 (59.5)	50.0 (55.4)
E	GT	5A Granby Terrace, Kings Cross, London, NW1 3SA	Free-field	68.3 (72.8)	68.9 (71.8)	70.3 (75.8)	68.4 (73.9)	63.6 (74.8)	67.5 (69.9)	68.5 (70.7)	67.3 (70.4)	66.8 (71.5)	61.2 (69.9)	65.0 (73.1)	61.1 (71.1)
F	BS	Roof of Stockbeck House, Barnby Street, Kings Cross, London, NW1 2RS	Free-field	56.9 (62.9)	61.5 (79.9)	57.4 (63.0)	56.6 (65.2)	53.1 (68.3)	54.9 (58.4)	55.3 (58.7)	55.4 (56.8)	55.0 (57.8)	51.2 (67.2)	54.2 (61.8)	51.6 (60.1)

[1] This monitor is located within the worksite and the measured noise levels and exceedances of the SOAEL are not representative of noise at the surrounding residential properties. Alternative locations for repositioning of this monitor are being considered in discussion with the Local Council.

2.2.3 Appendix C presents graphs of noise monitoring data over the period for each of the measurement locations. Noise data presented consist of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). The full data set for the monitoring equipment can be found at the following location: https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data.

2.3 Exceedances of trigger level

2.3.1 Table 6 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction measured during the reporting period, along with the findings of any investigation.

Table 6: Summary of exceedances of trigger levels.

Complaint reference number (if applicable)	Worksite reference	Date and time period	Identified Source	Results of investigation (including noise monitoring results)	Actions taken
-	-	-	-	-	-

2.3.2 There were no exceedances of trigger levels as defined in section 61 consents during the reporting period at any monitoring position.

2.4 Complaints

2.4.1 Table 7 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

Table 7: Summary of complaints.

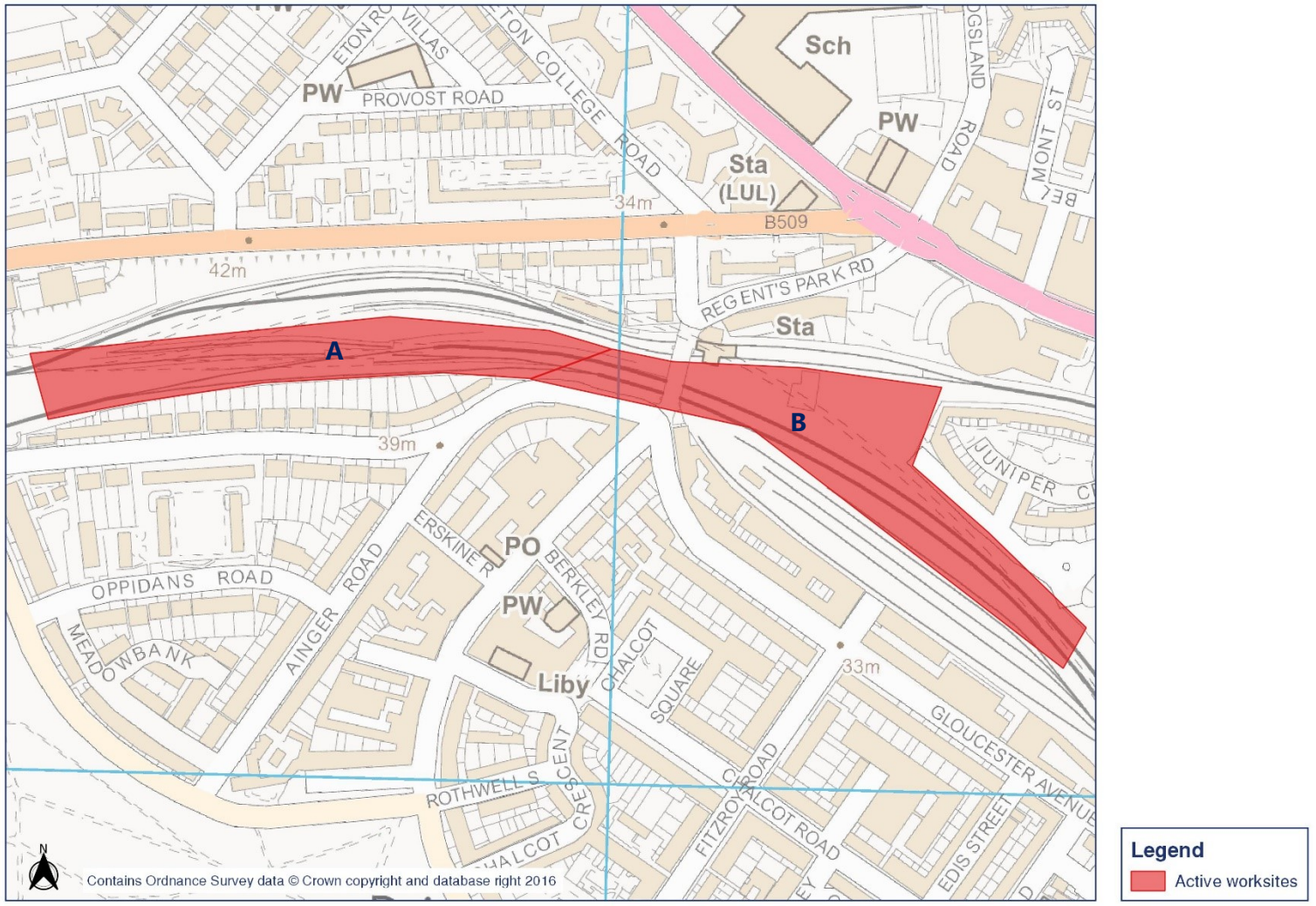
Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
N/A	Granby Terrace	Complaint regarding HS2 workers shouting at 07:00	Investigation found NR works occurring during this time.	NR issued reminder to subcontractors to ensure their workforce have consideration of their behaviour when working in close proximity to local residents. HS2 sub contractors also reminded of the same.

Complaint reference number	Worksite reference	Description of complaint	Results of investigation	Actions taken
				Response sent to complainant detailing investigation and outcomes.
N/A	E	Complaint regarding noise disturbance from whirring / humming of a machine during night-time period.	Investigation by contractors found that noise disturbance may have been caused by NR maintenance work. No HS2 works were being undertaken at the time.	Resident was advised and complaint passed to NR to investigate with regards to their non HS2 related works.
N/A	C	Complaint regarding noise from construction works between Mornington Street Bridge and Parkway.	Investigation found emergency NR repair works were occurring due to a cracked crossing and not HS2 related.	NR contacted resident directly to provide feedback.
N/A	E	Complaint regarding noise disturbance from generator during a night-time period.	Hybrid generator runs during daytime hours and charges batteries for use overnight (for security lighting). An electronics fault caused the batteries to drain much faster than anticipated triggering generator backup during night time hours.	Generator manually switched off at end of shift until problem resolved. Site security instructed to monitor for generator noise at regular intervals. Resident contacted and advised of action taken.
N/A	S003-WS03	Complaint regarding barking dog within St James's Gardens	HS2 dog patrols are being temporarily used to provide security while a CCTV system is installed. Security sub-contractor protocol states muzzled patrol dogs are to be used to prevent dog from barking. Barking likely to be from another source such as domestic pets / foxes.	Sub-contractor made aware of complaint and directed to monitor for any barking. Resident advised of outcome of investigation.

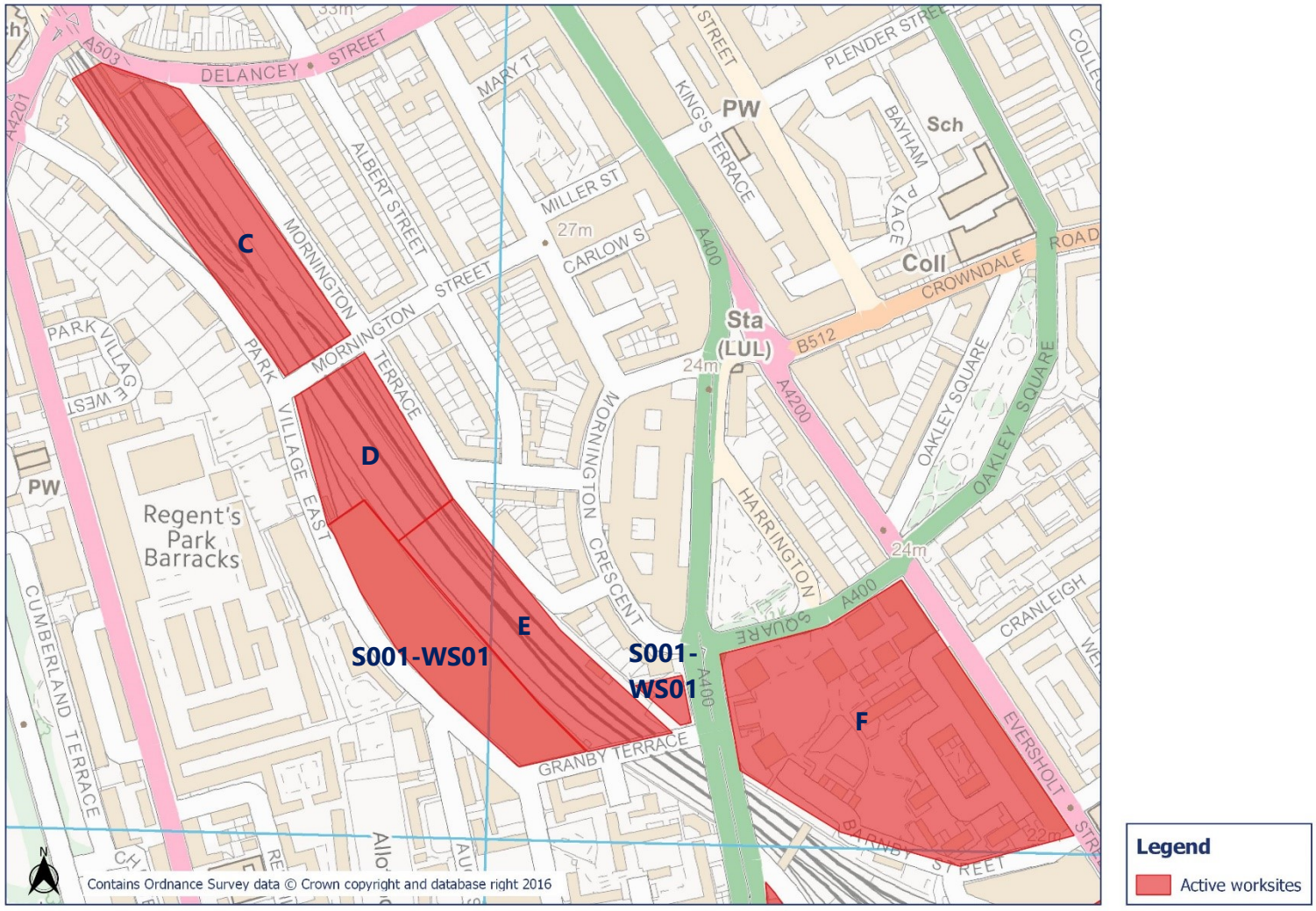
Appendix A Site Locations

HS2

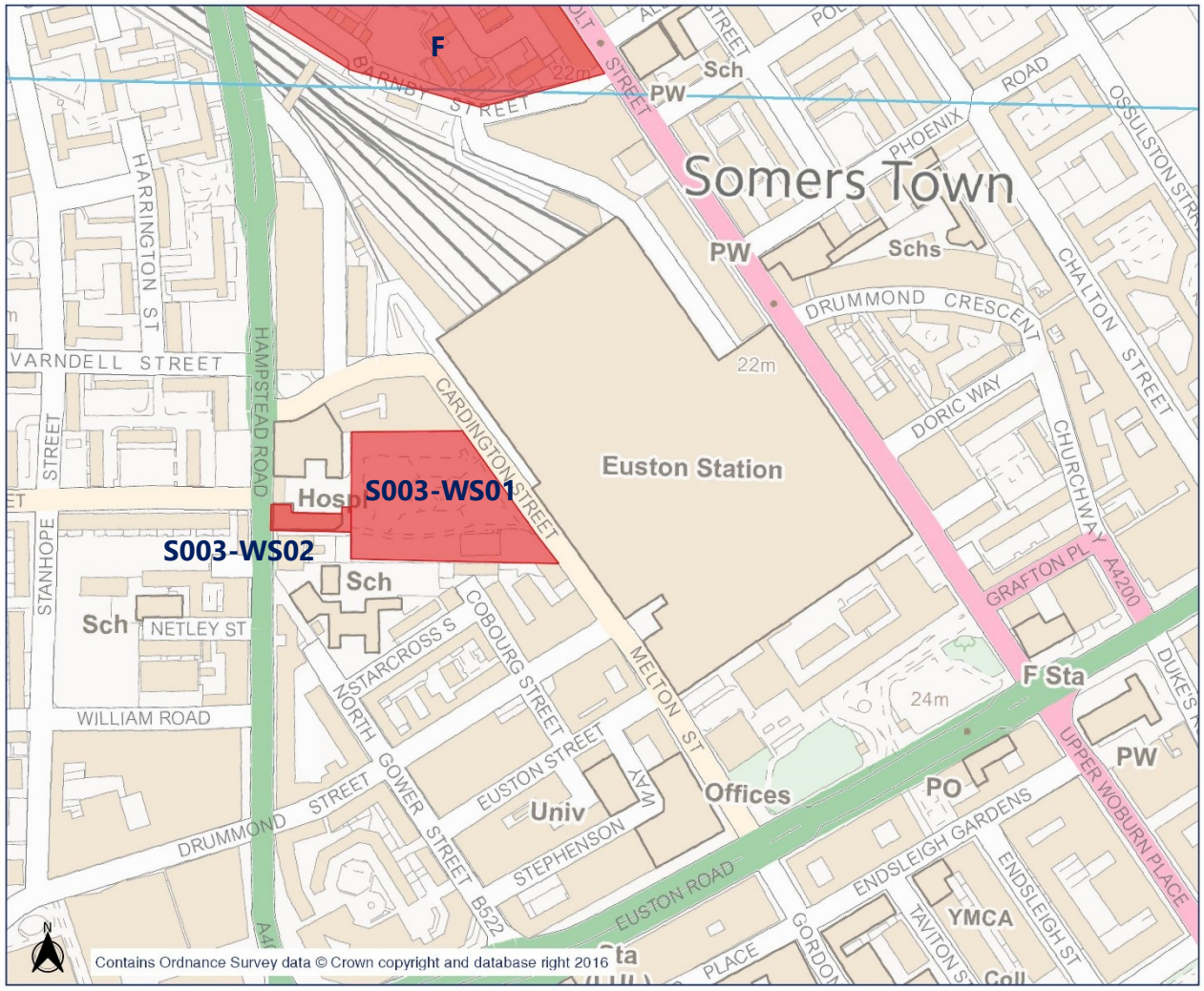
Worksite identification plan - 1



Worksite identification plan - 2



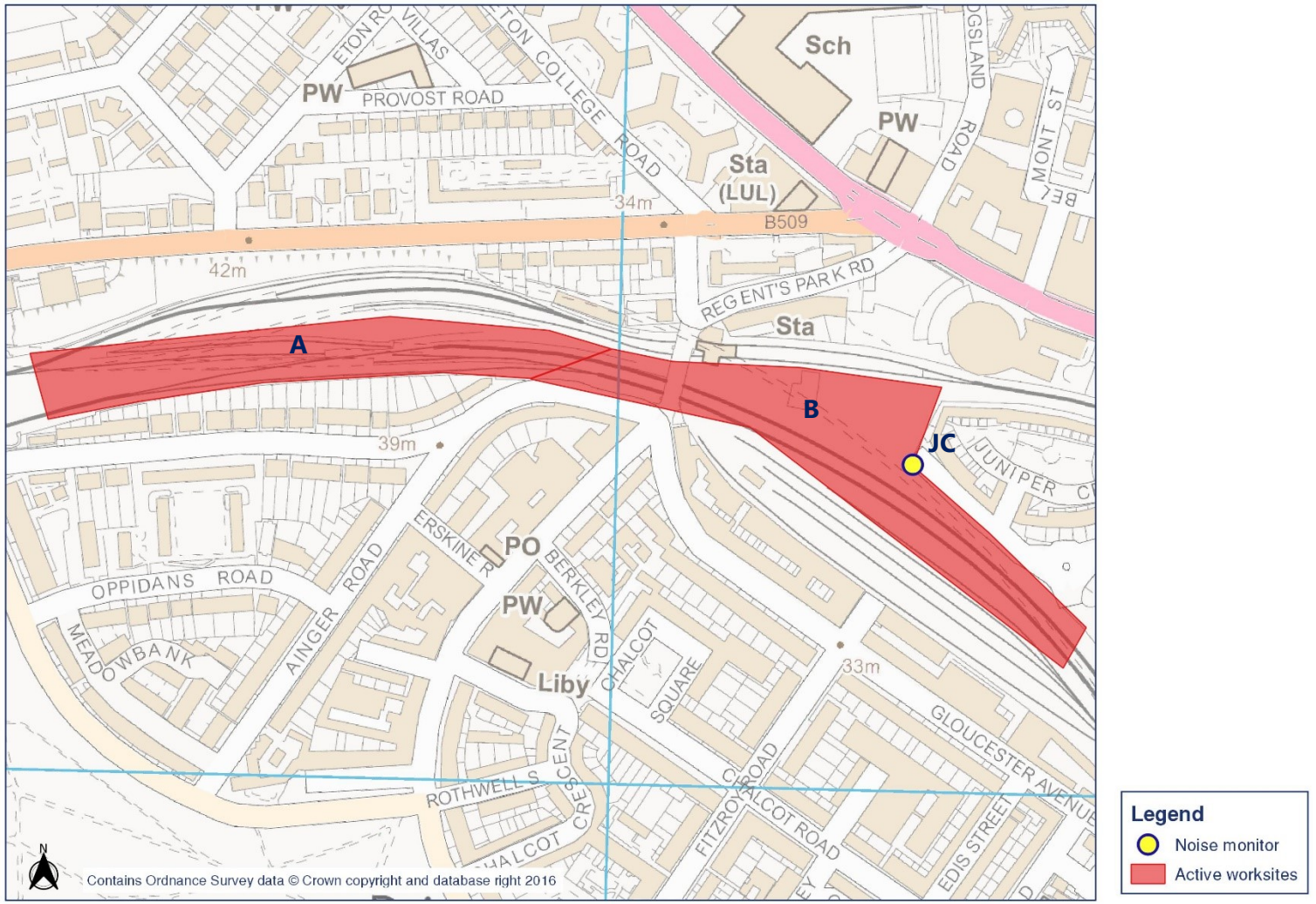
Worksite identification plan - 3



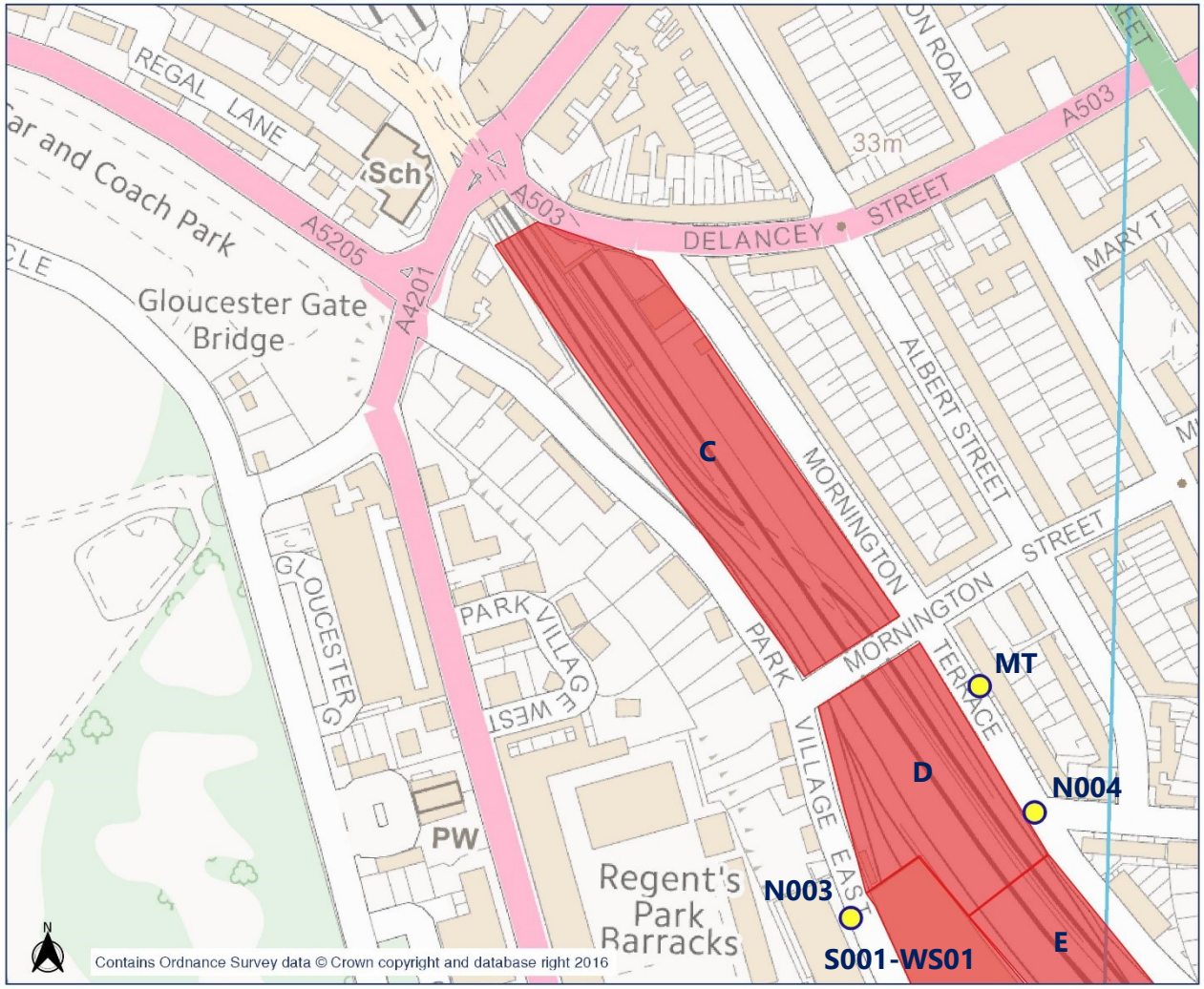
Appendix B Monitoring Locations

HS2

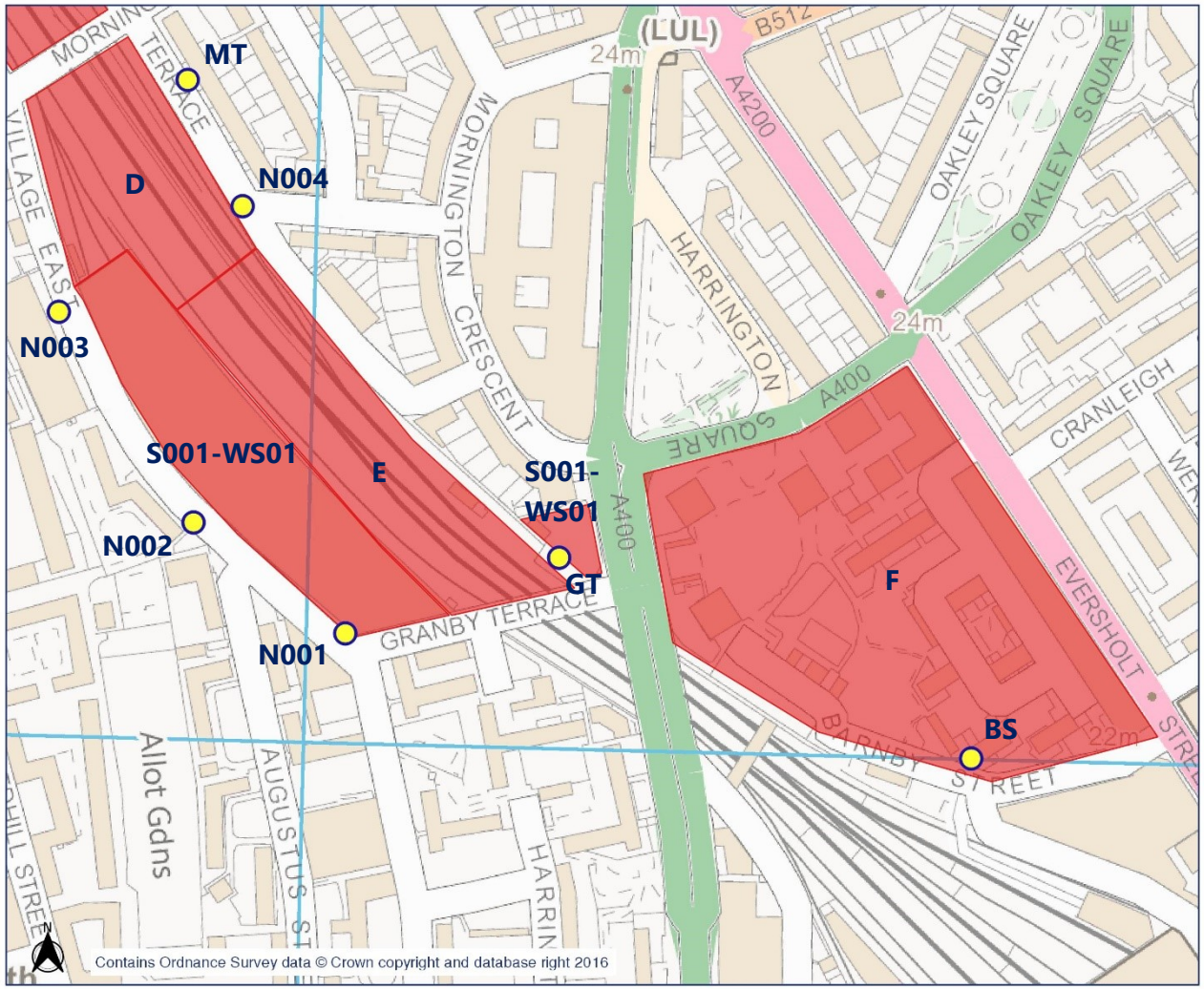
Noise monitoring plan - 1



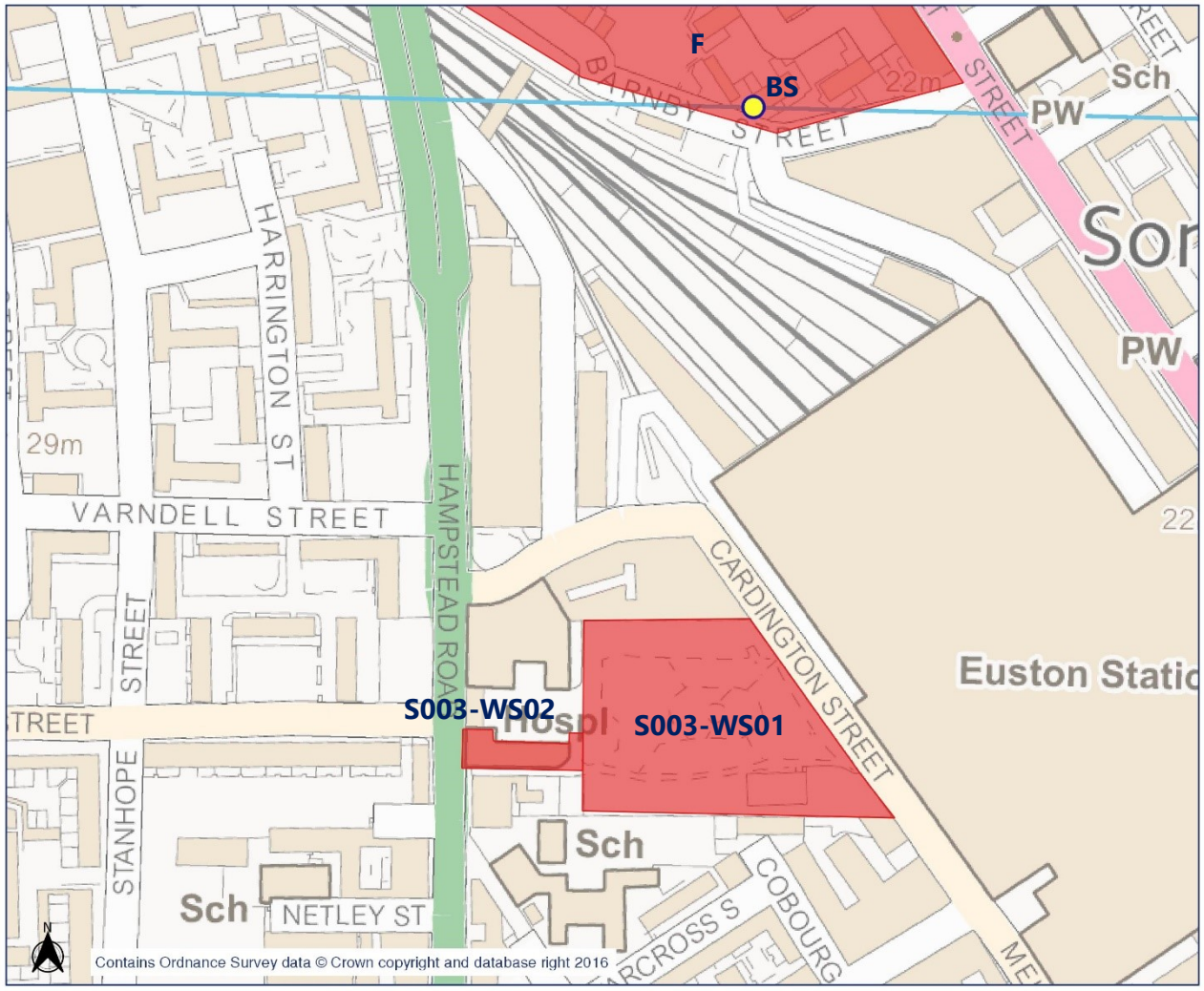
Noise monitoring plan - 2



Noise monitoring plan - 3



Noise monitoring plan - 4

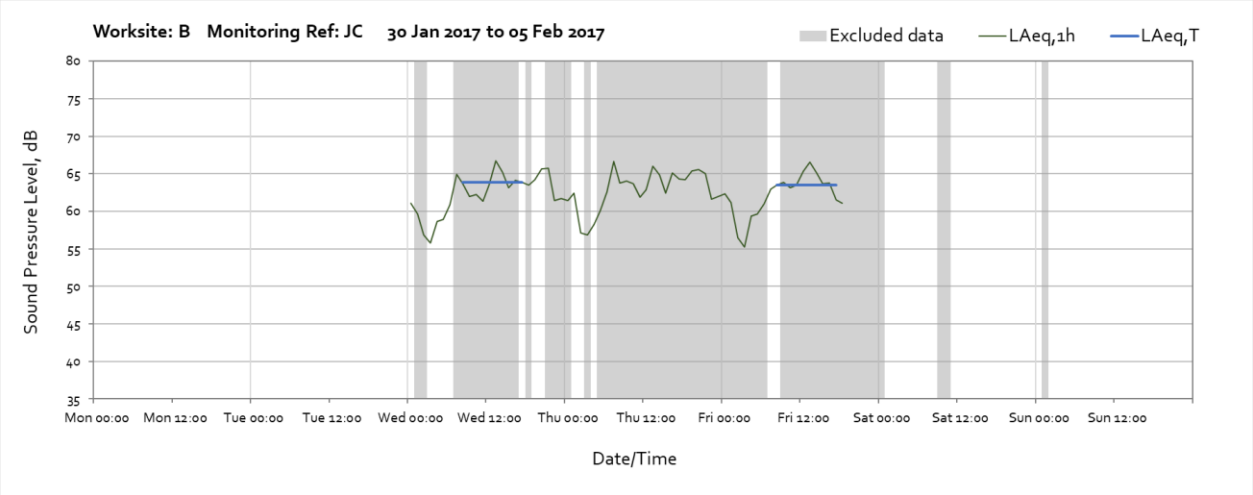


Appendix C Data

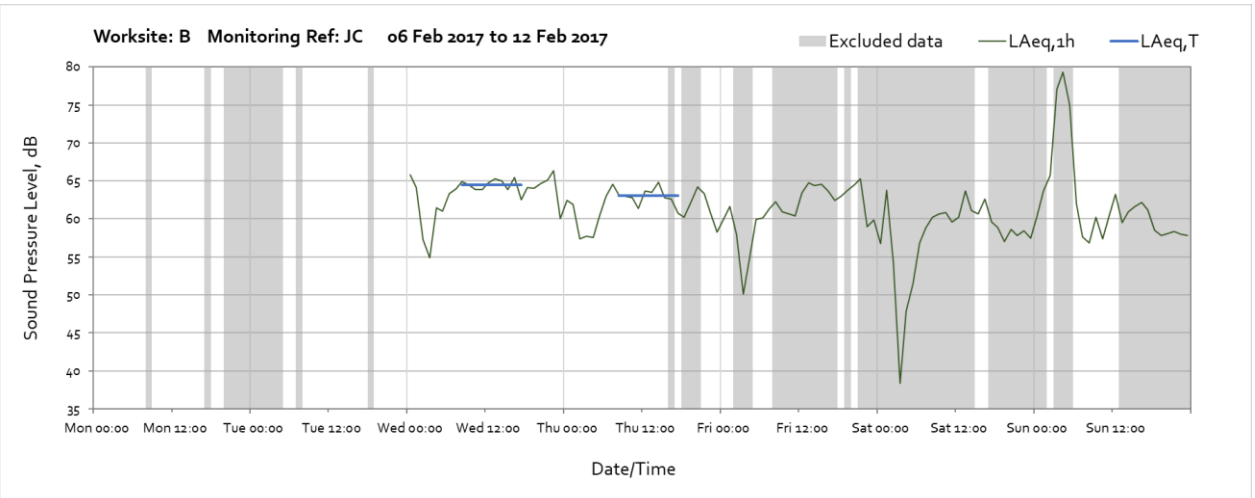
Noise

The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in Table 5.

Worksite: B – Monitoring Ref: JC



Note – Missing data between 19:00 on Friday 3rd and 00:00 on Wednesday 8th of February due to a loss of power at the noise monitor.



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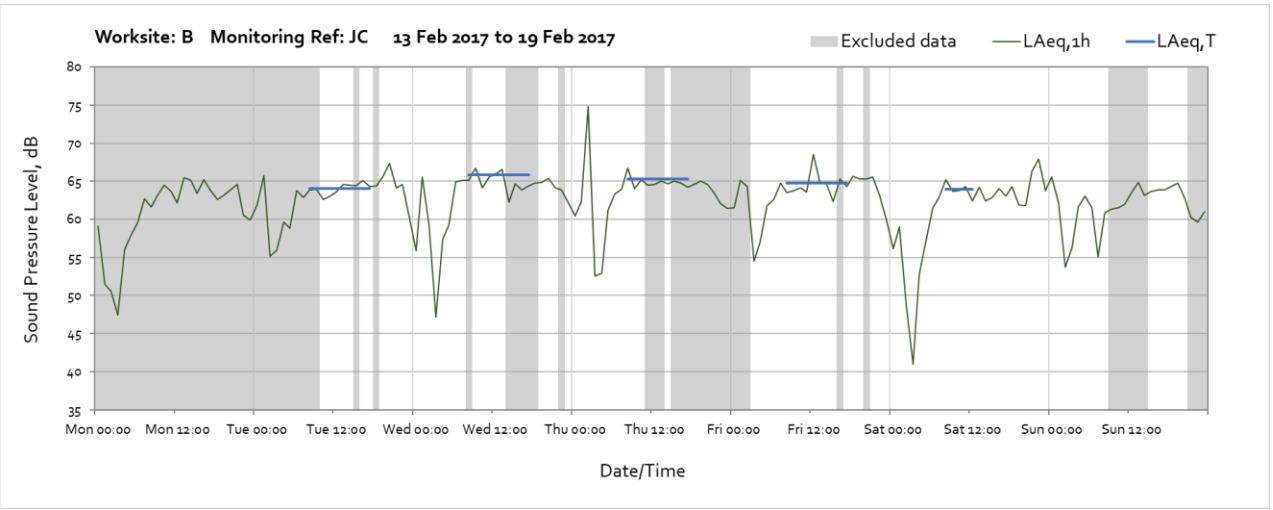

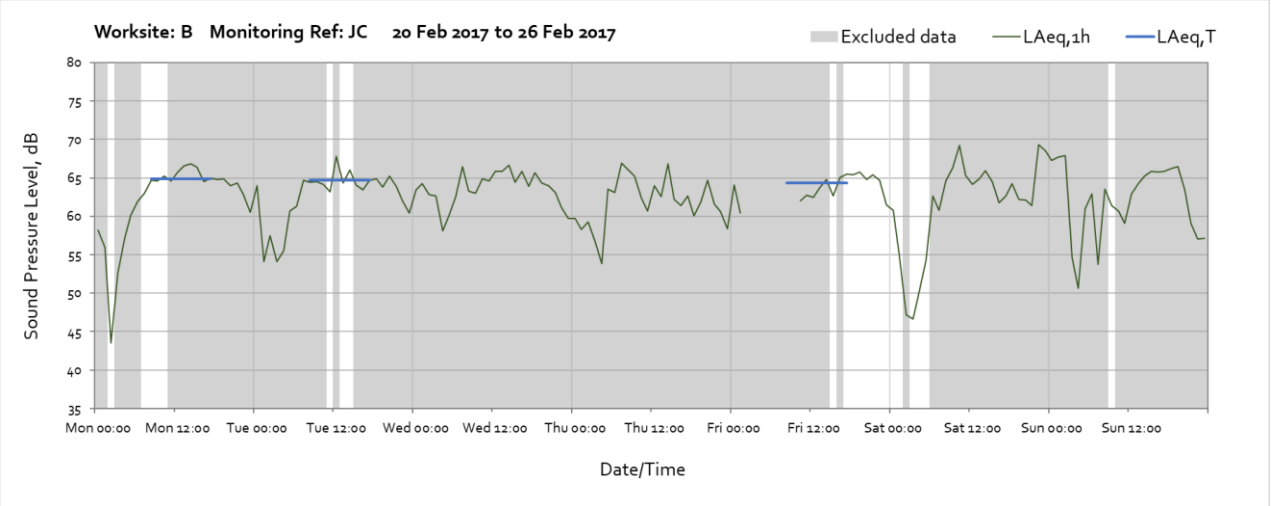

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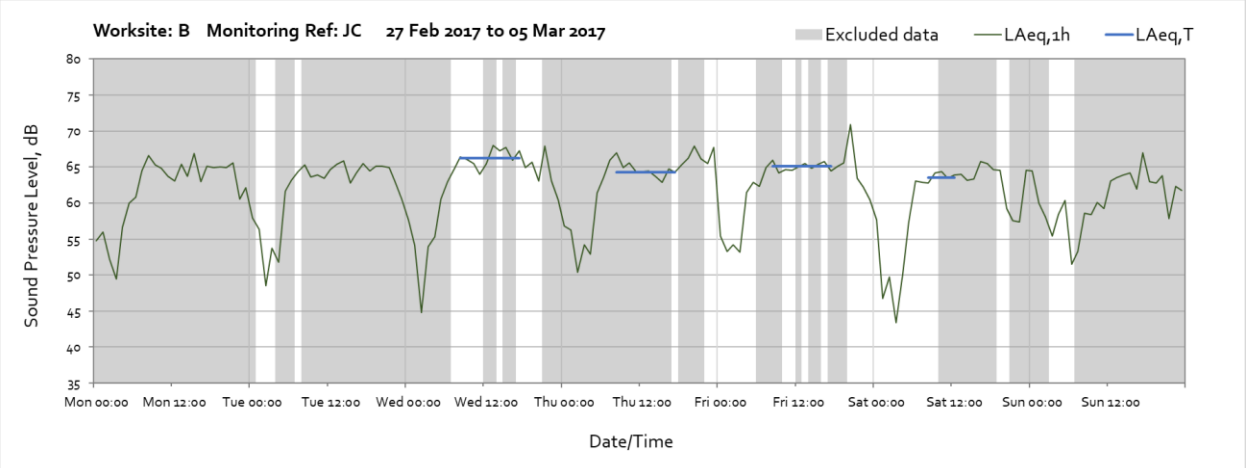

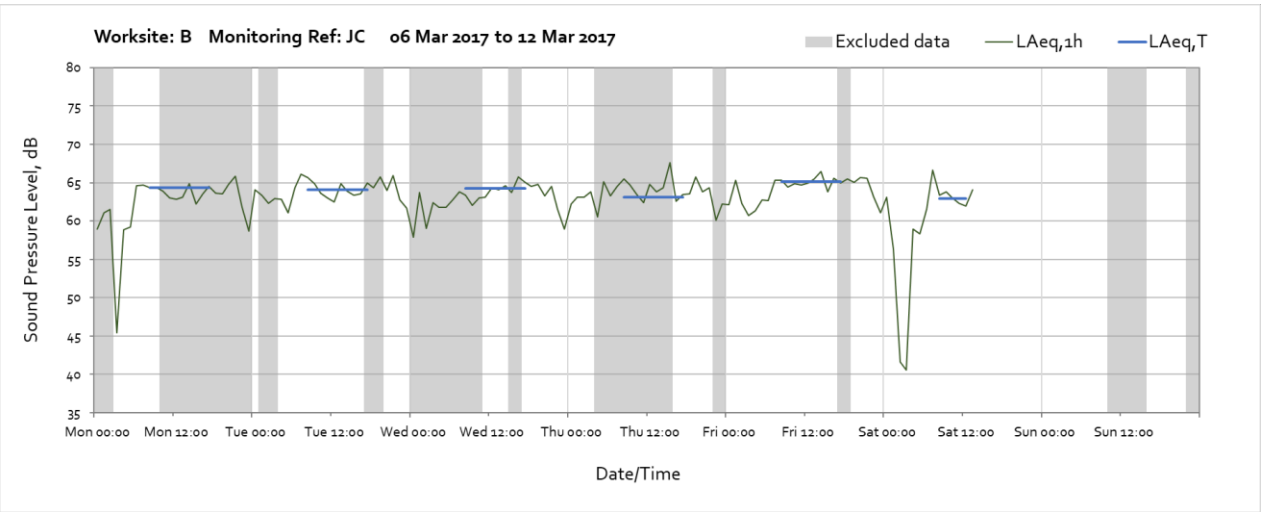

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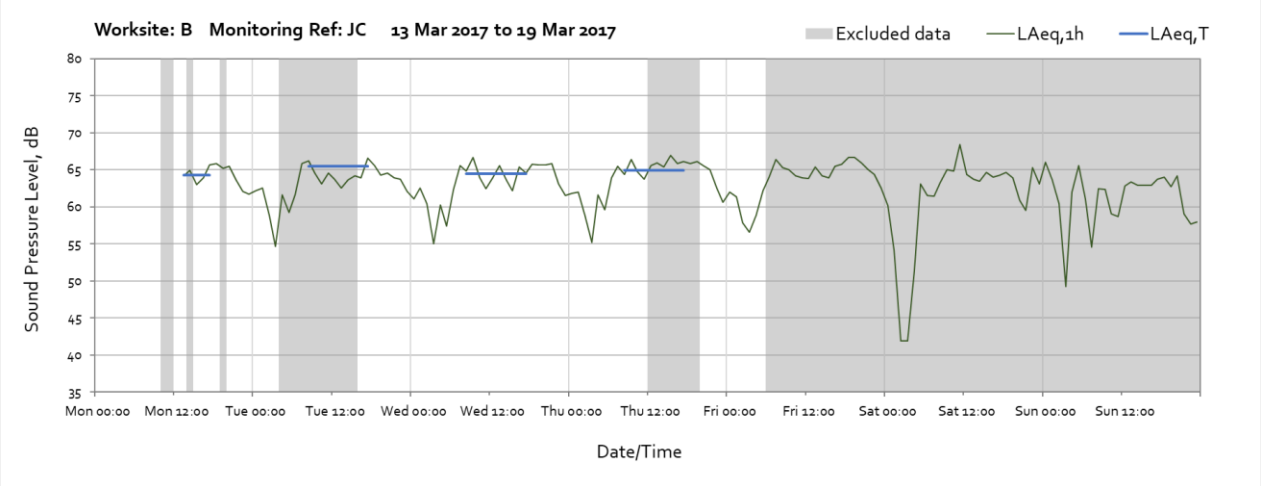

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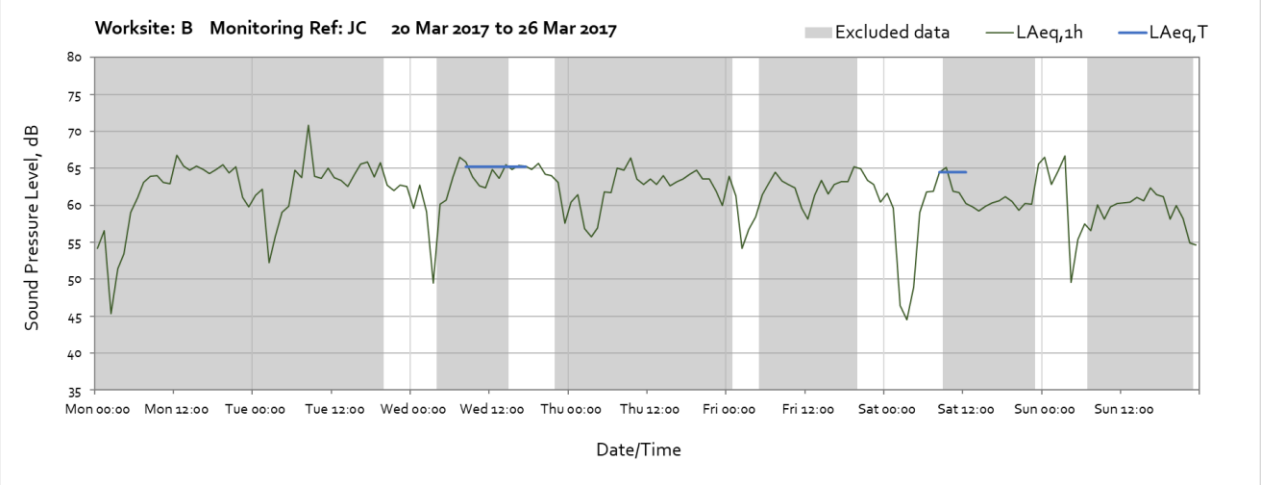

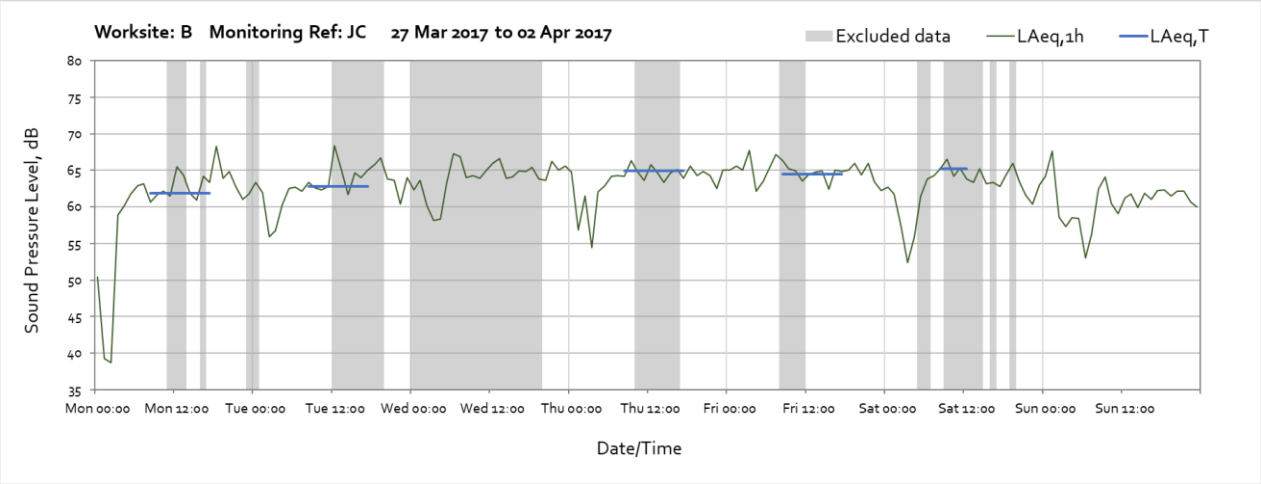

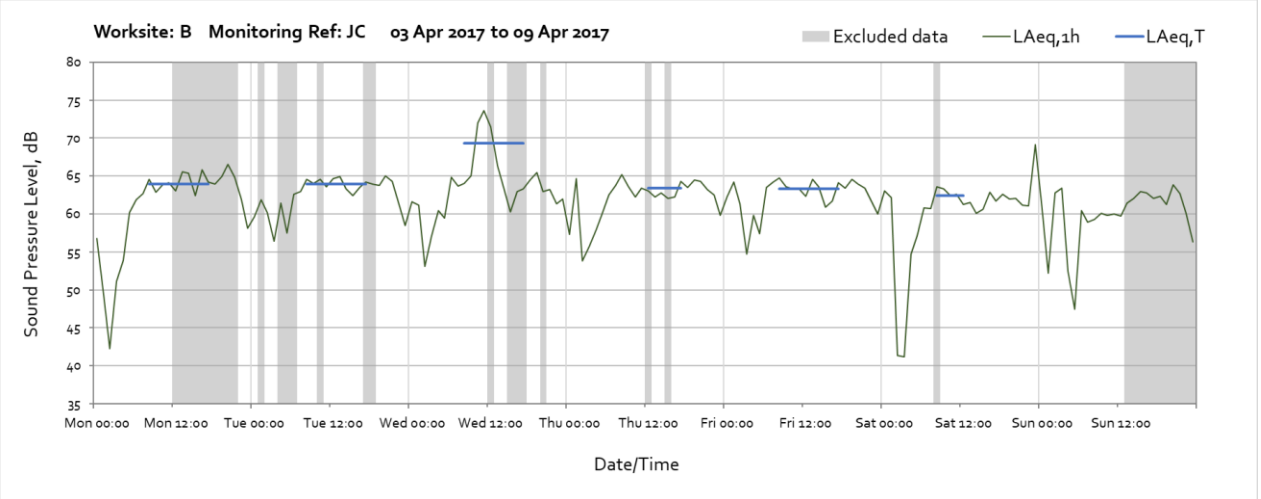

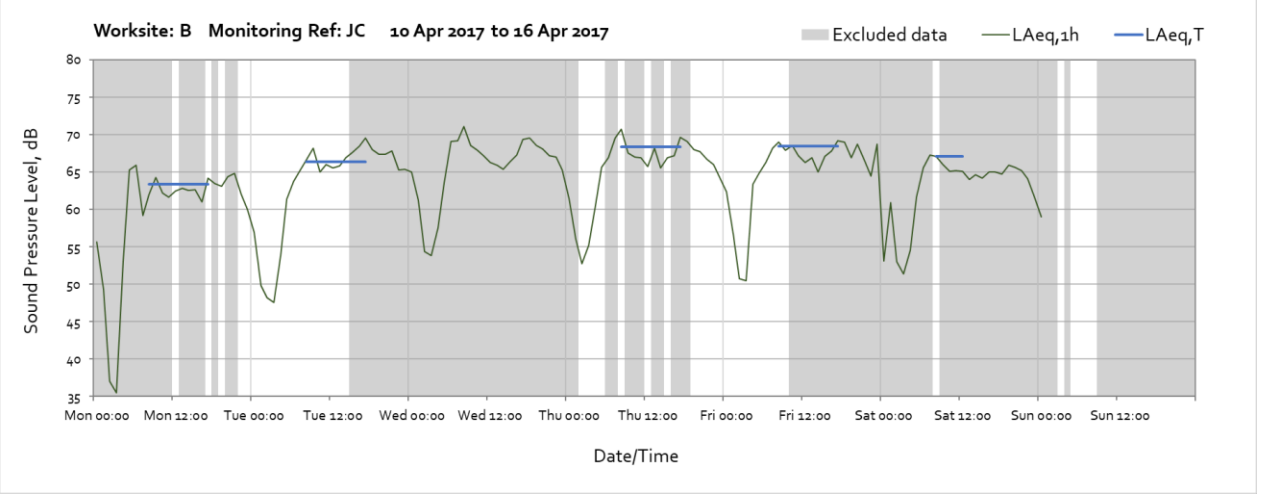

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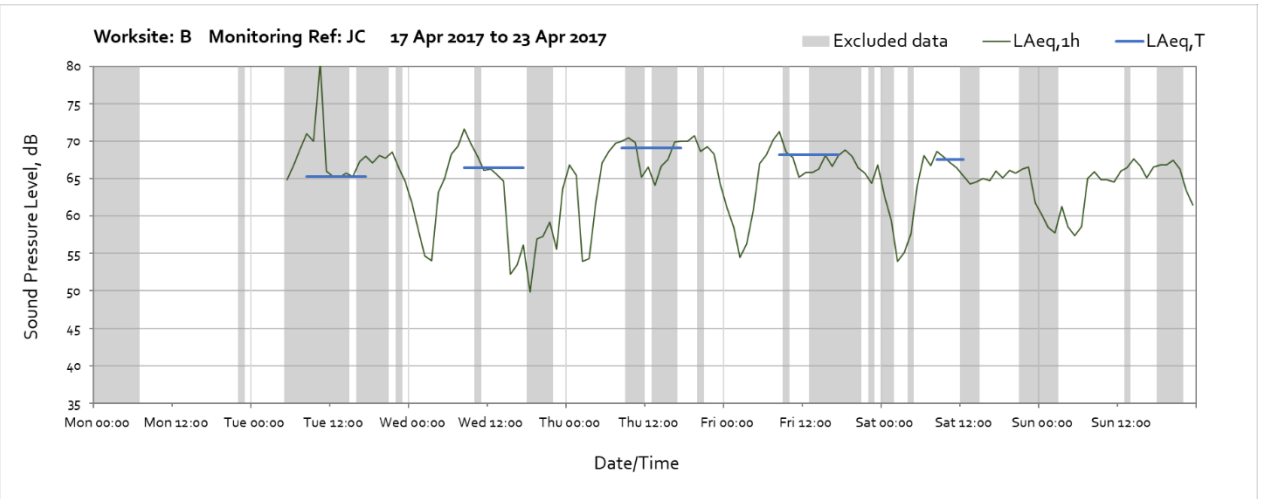

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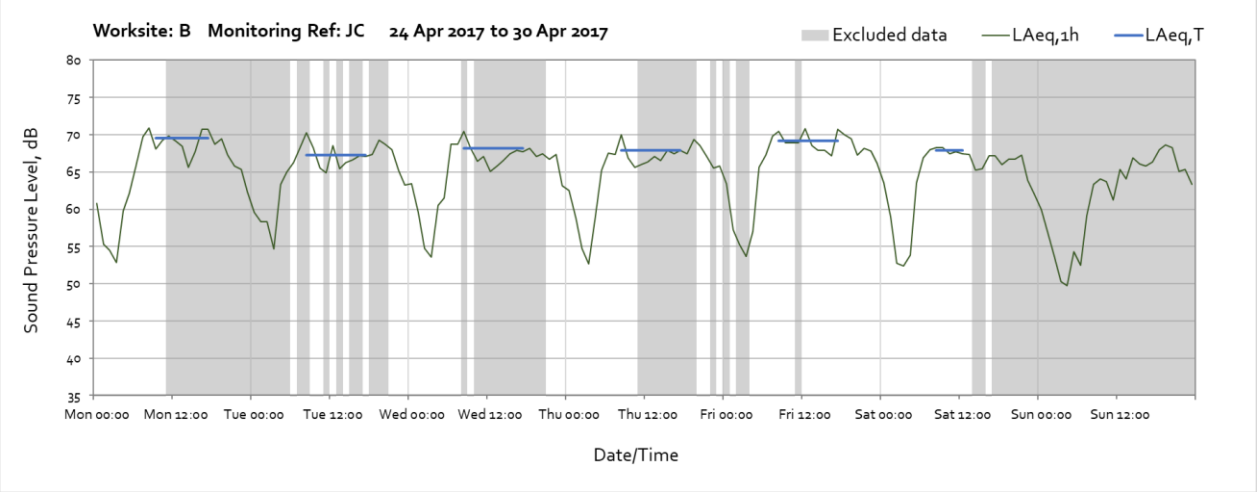
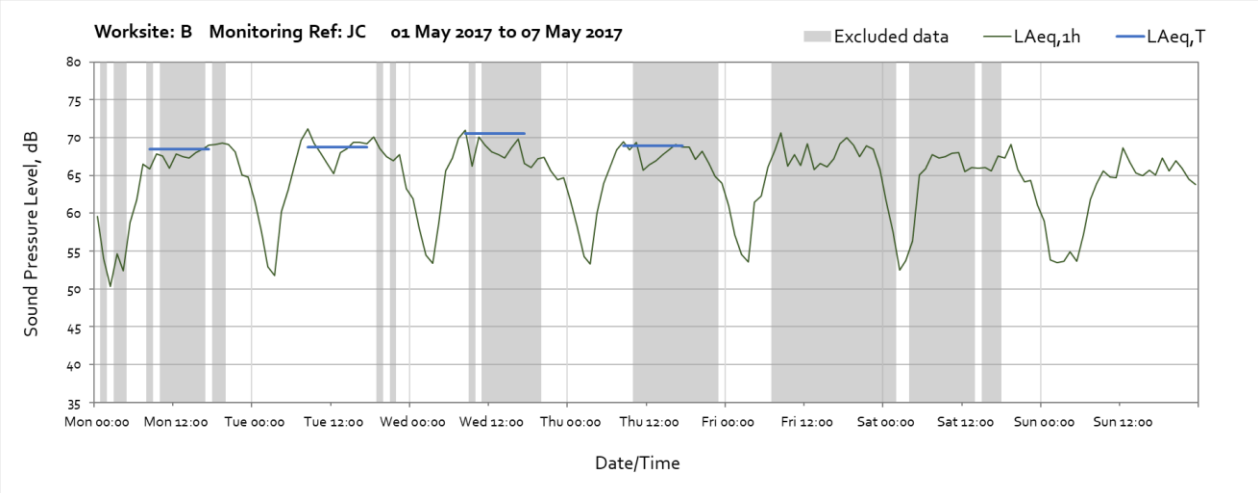
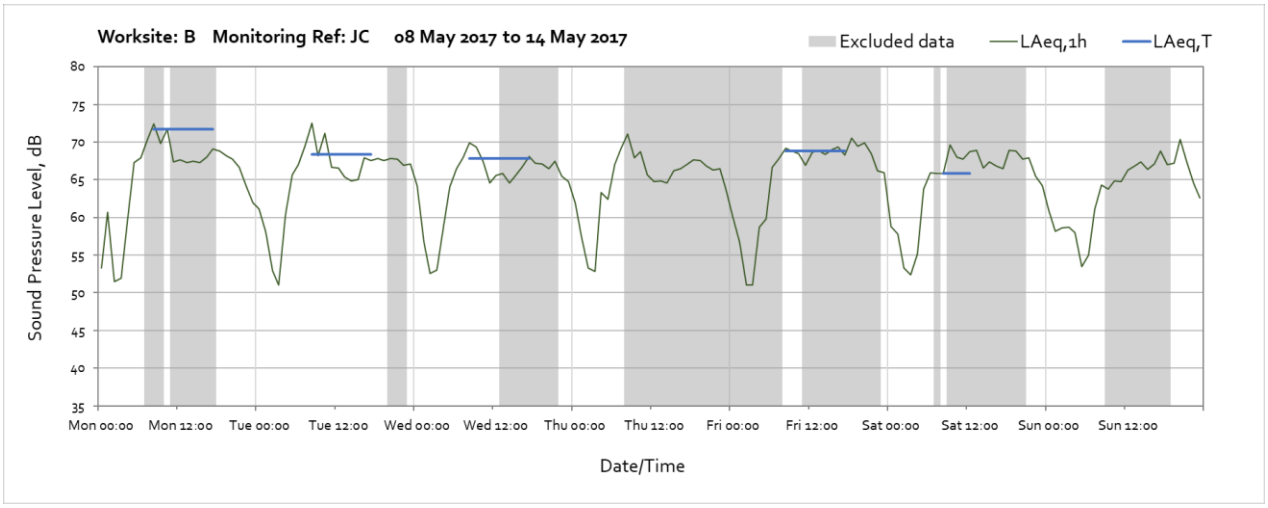
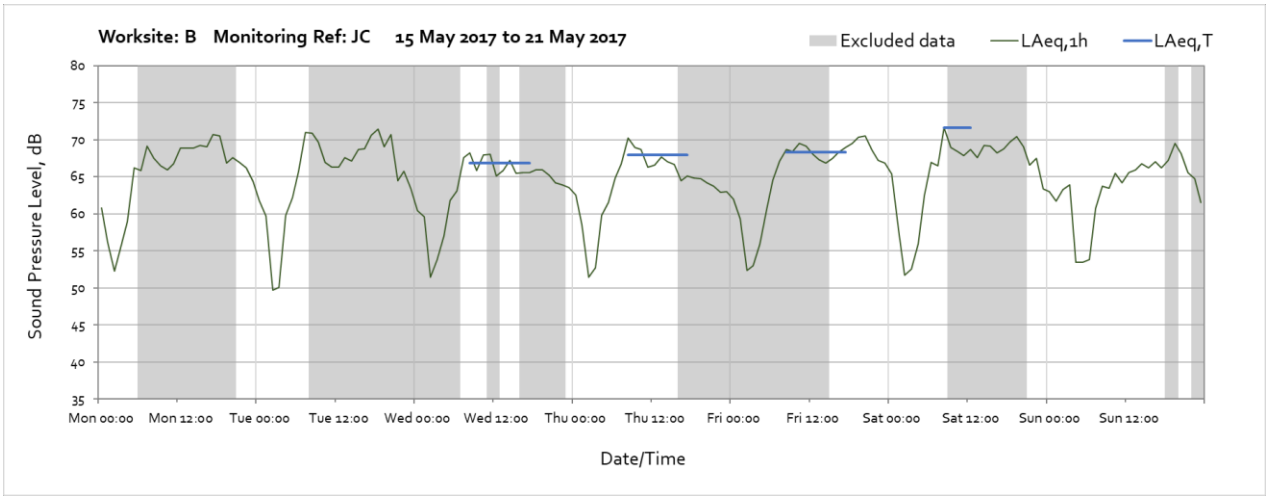
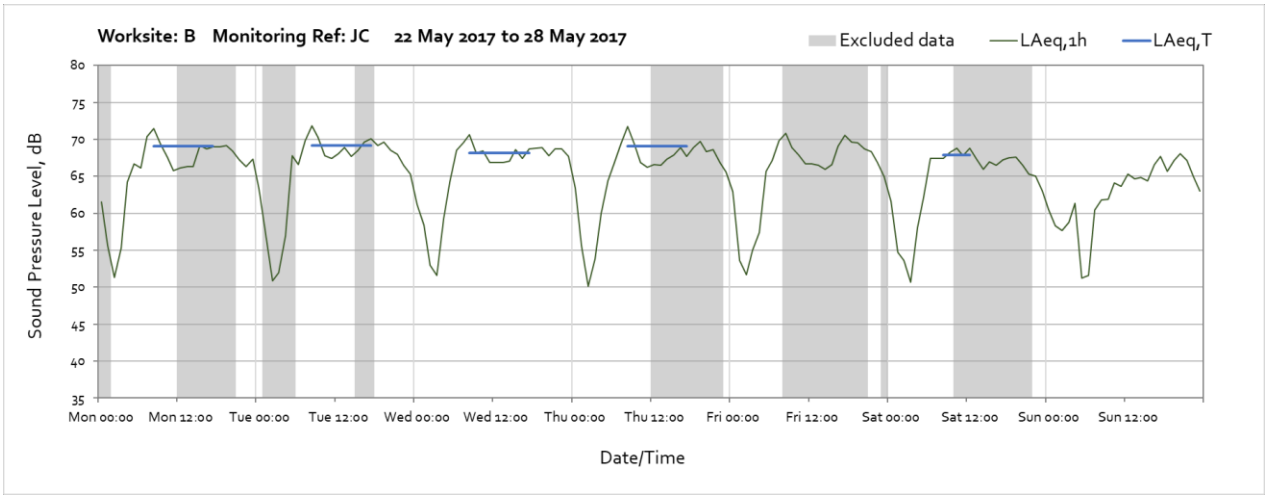
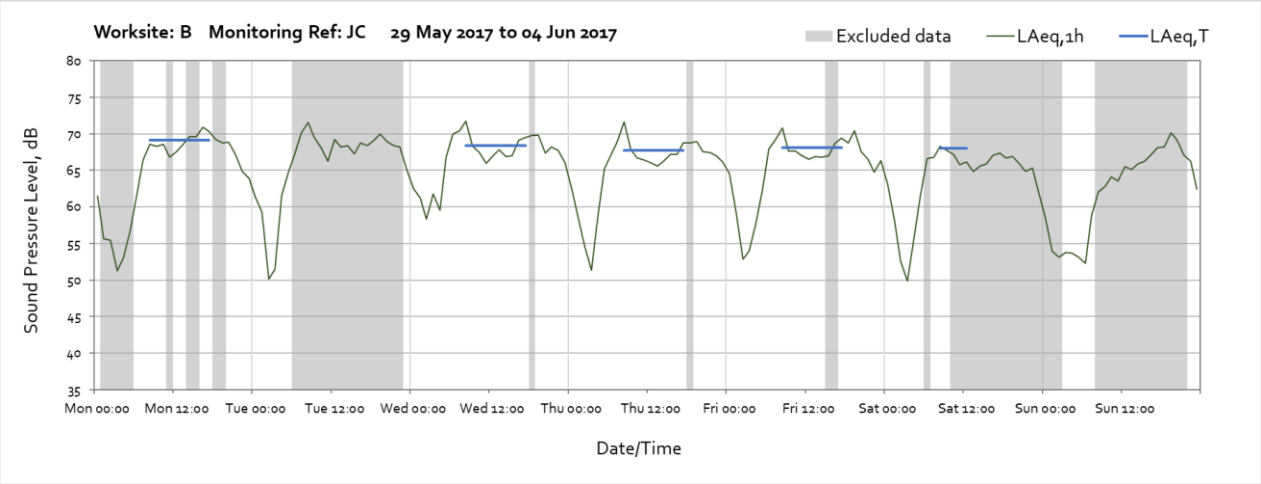


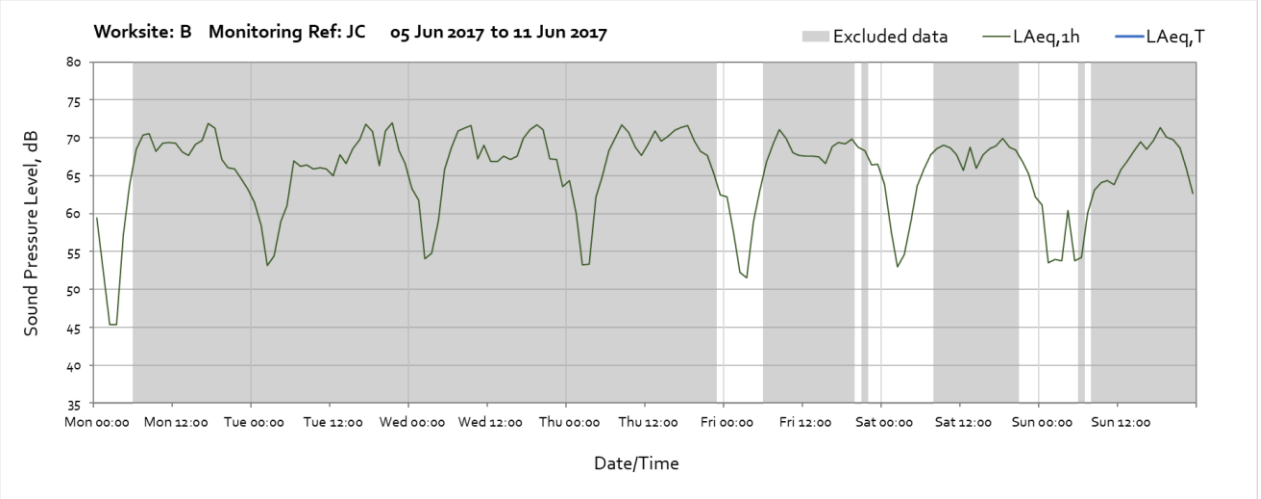


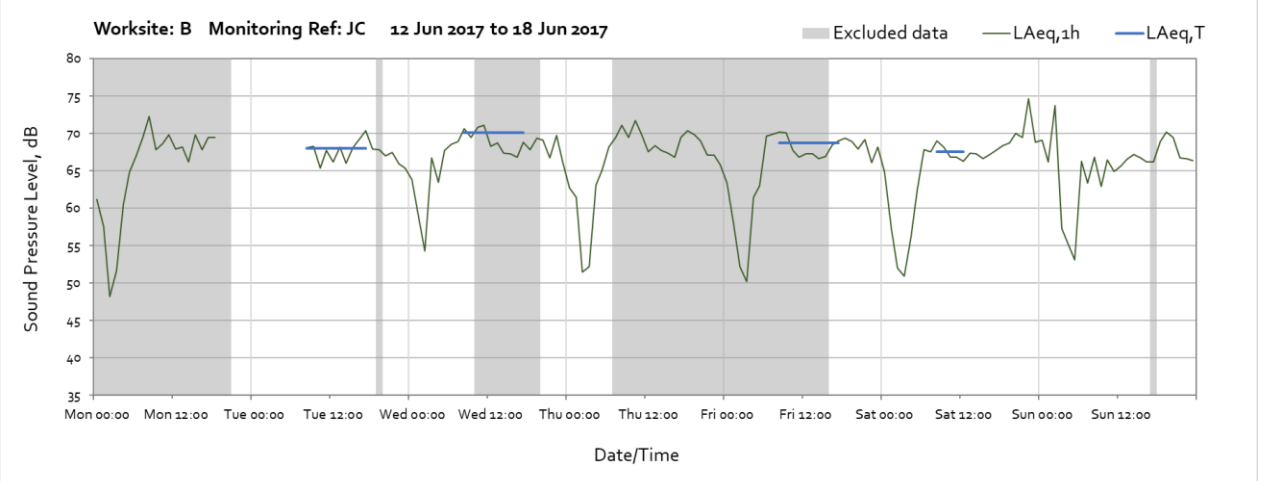

Worksite: B Monitoring Ref: JC 08 May 2017 to 14 May 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: B Monitoring Ref: JC 15 May 2017 to 21 May 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

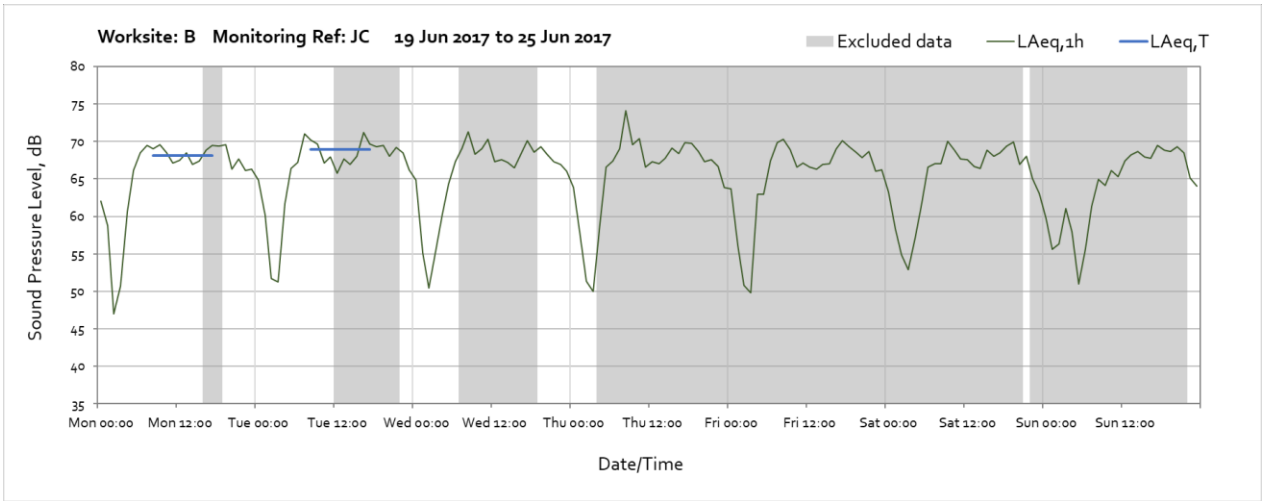

Worksite: B Monitoring Ref: JC 22 May 2017 to 28 May 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time







Note – Missing data between 19:00 on Monday 12th and 08:00 on Tuesday 13th of June due to a loss of power at the noise monitor.


Worksite: B Monitoring Ref: JC 19 Jun 2017 to 25 Jun 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
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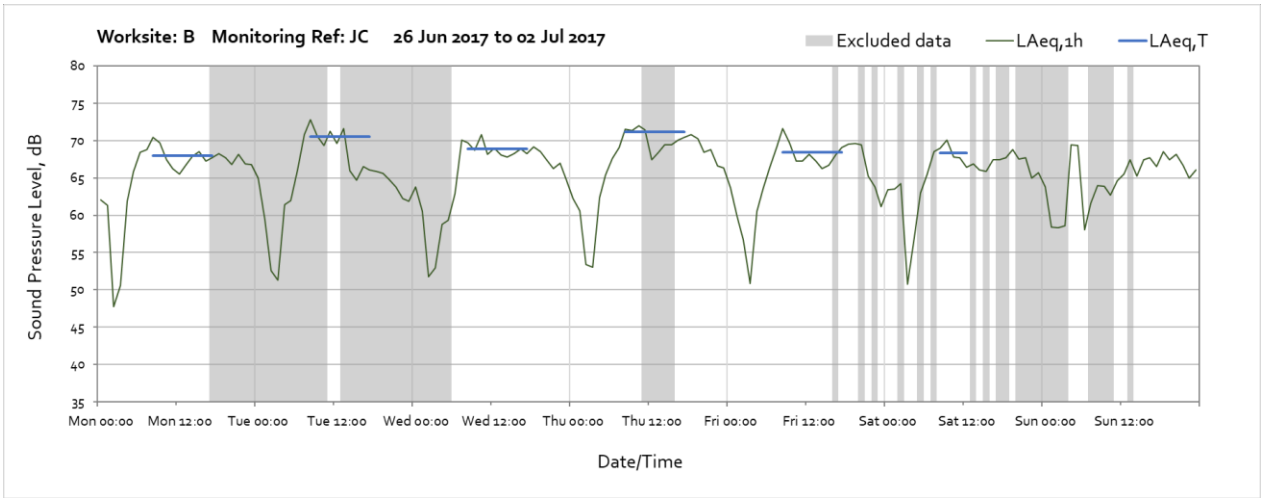
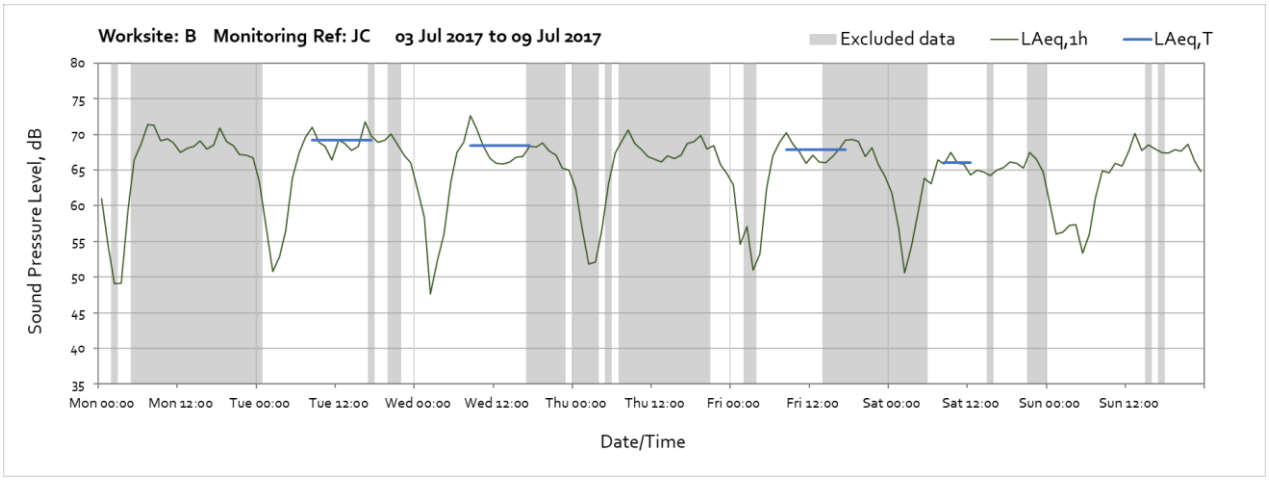
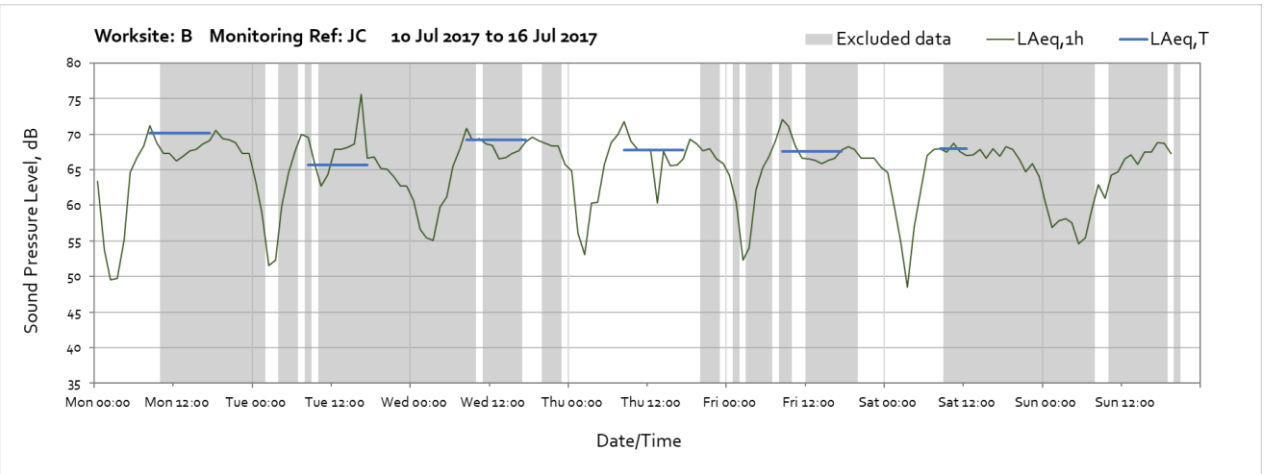
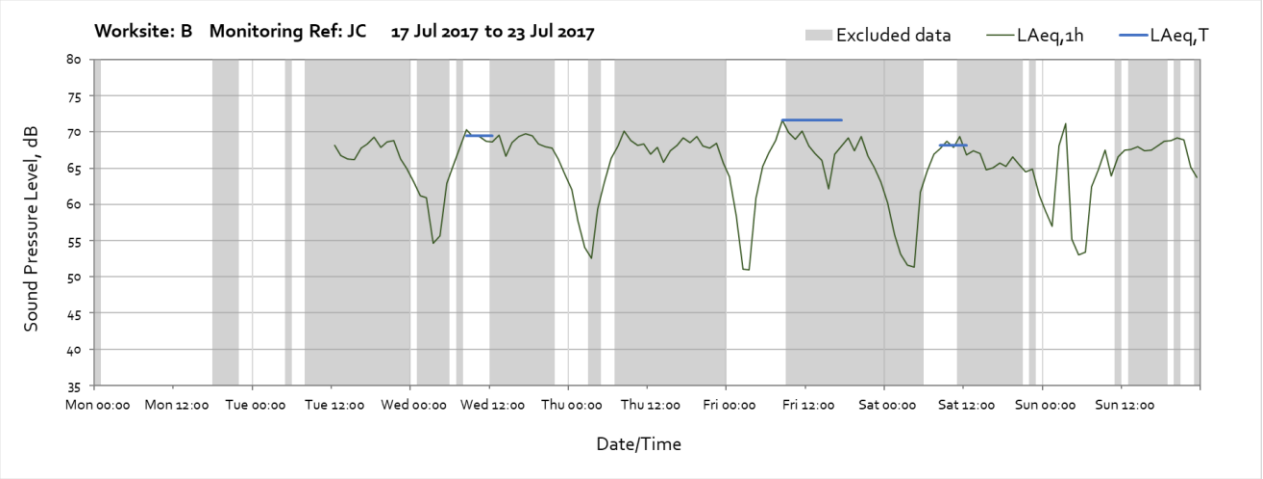
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: B Monitoring Ref: JC 26 Jun 2017 to 02 Jul 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

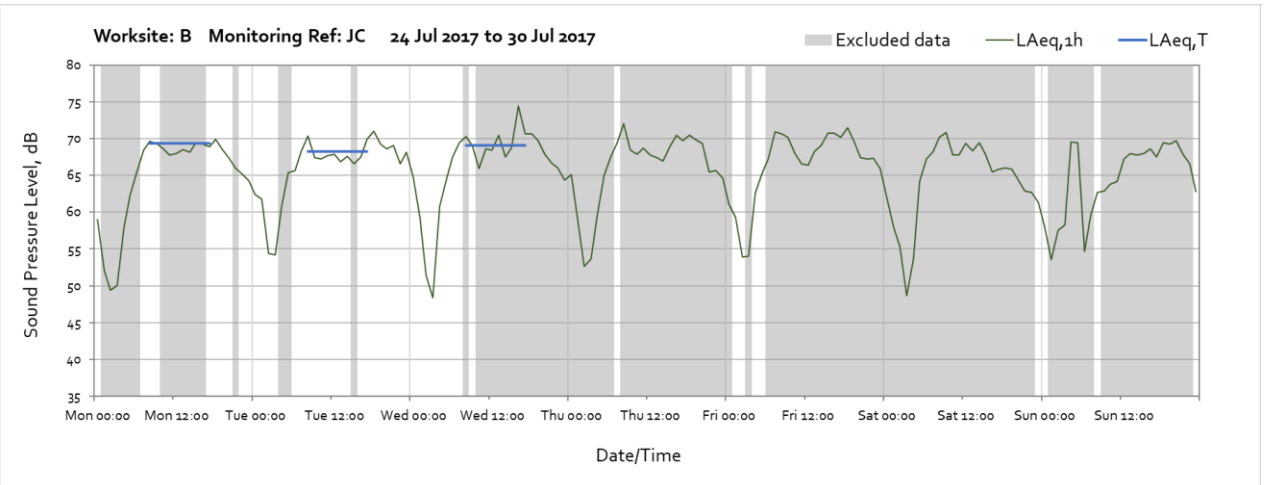

Worksite: B Monitoring Ref: JC 03 Jul 2017 to 09 Jul 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

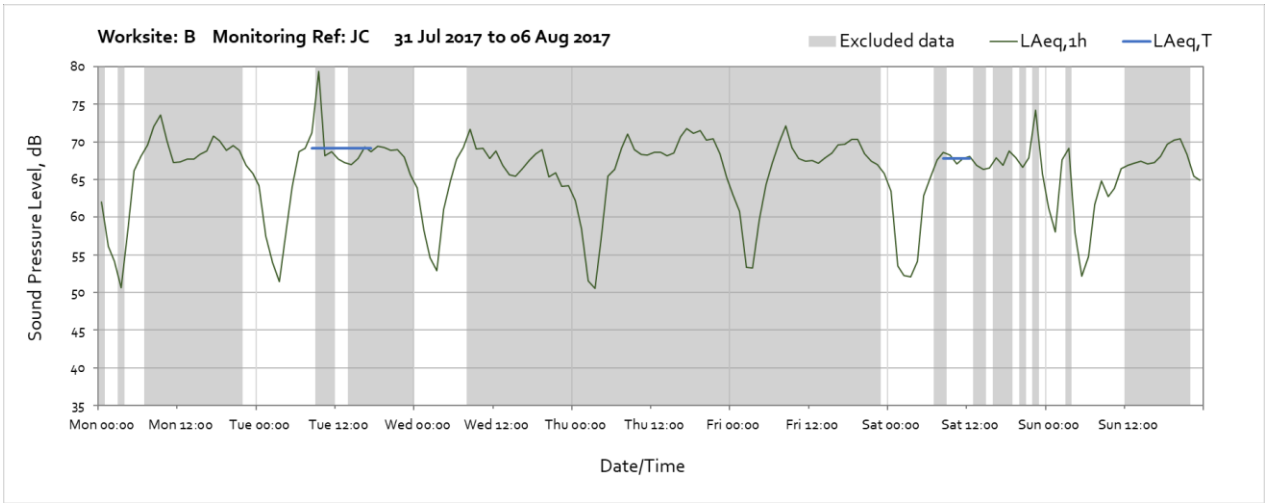


Note – Missing data between 20:00 on Sunday 16th and 12:00 on Tuesday 18th of July due to a loss of power at the noise monitor.



Note – Missing data between 20:00 on Sunday 16th and 12:00 on Tuesday 18th of July due to a loss of power at the noise monitor.




Worksite: B Monitoring Ref: JC 31 Jul 2017 to 06 Aug 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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Thu 12:00
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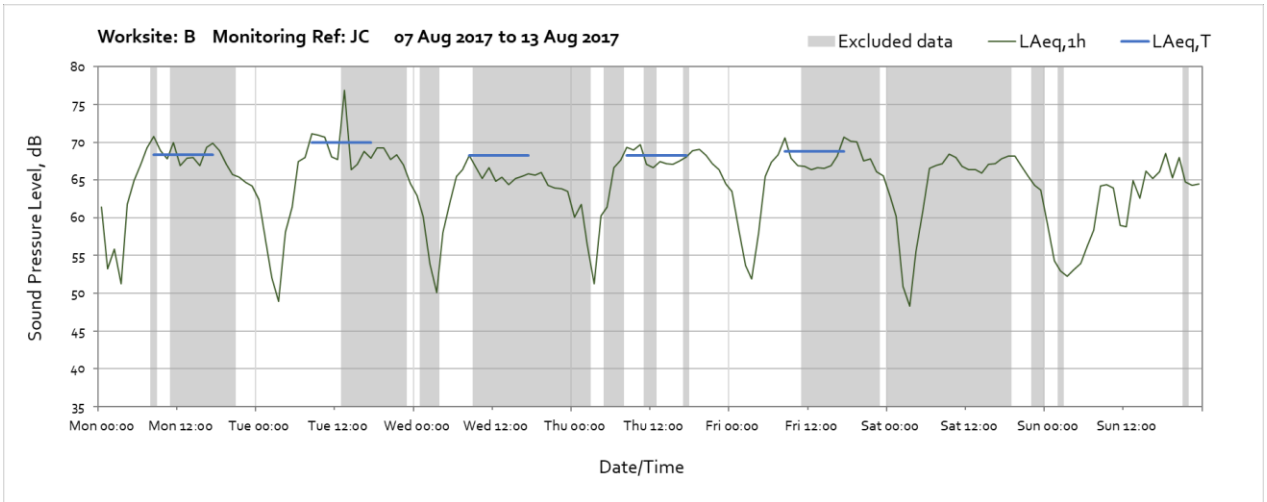
Sun 00:00
Sun 12:00
Date/Time


Worksite: B Monitoring Ref: JC 07 Aug 2017 to 13 Aug 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
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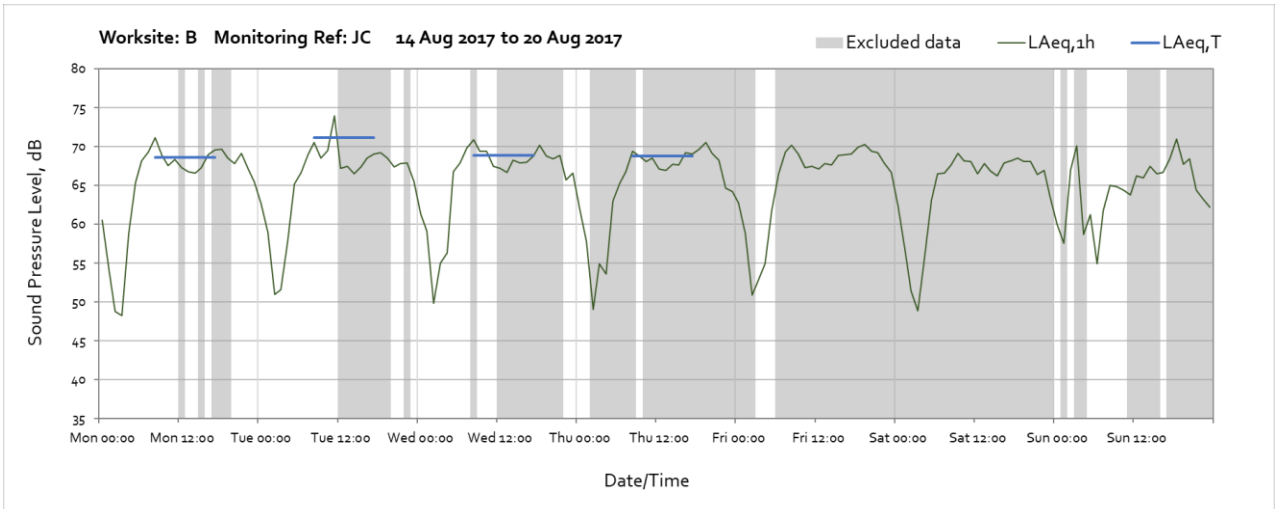
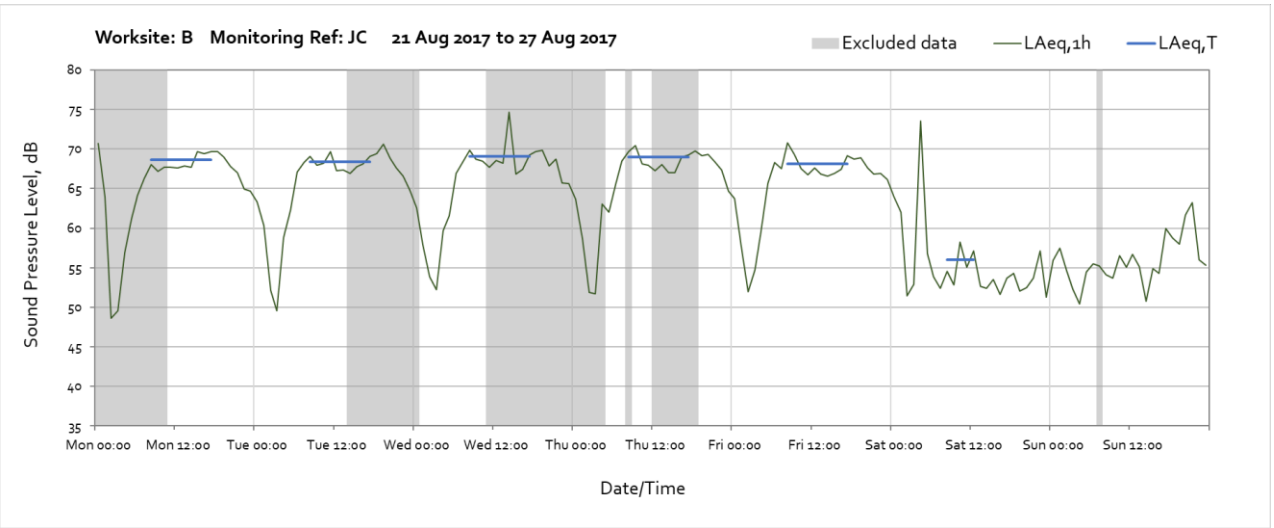
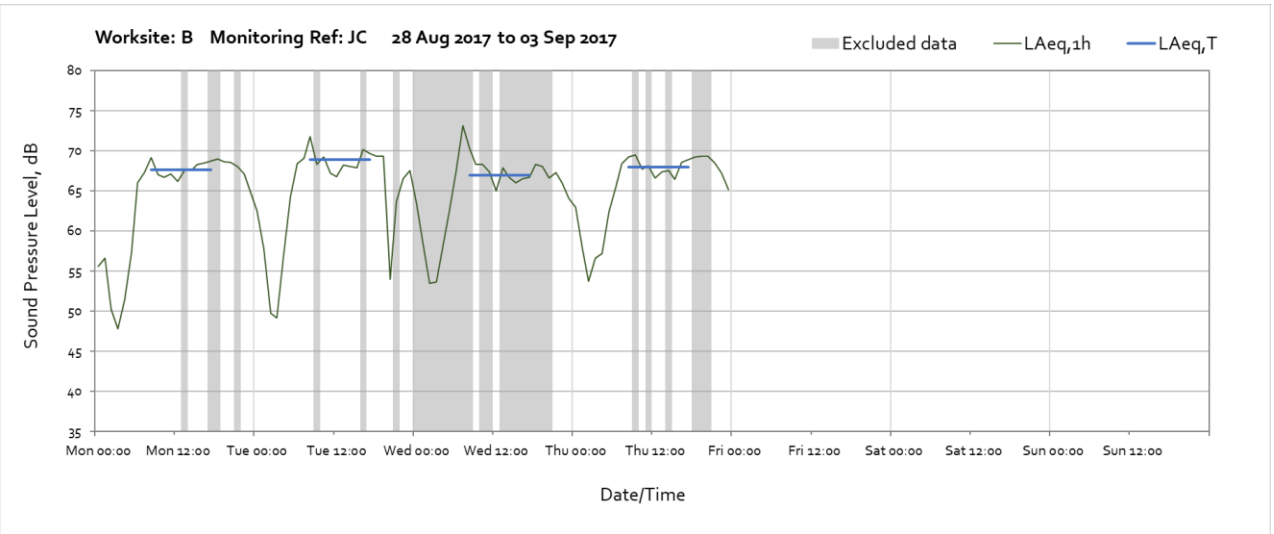
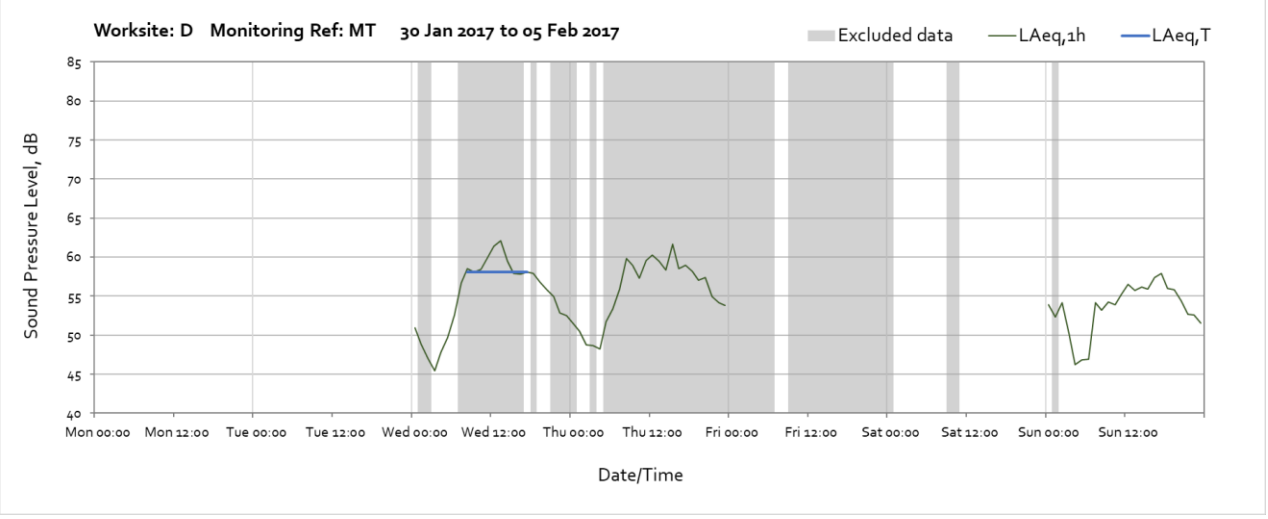
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: B Monitoring Ref: JC 14 Aug 2017 to 20 Aug 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
80
75
70
65
60
55
50
45
40
35
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

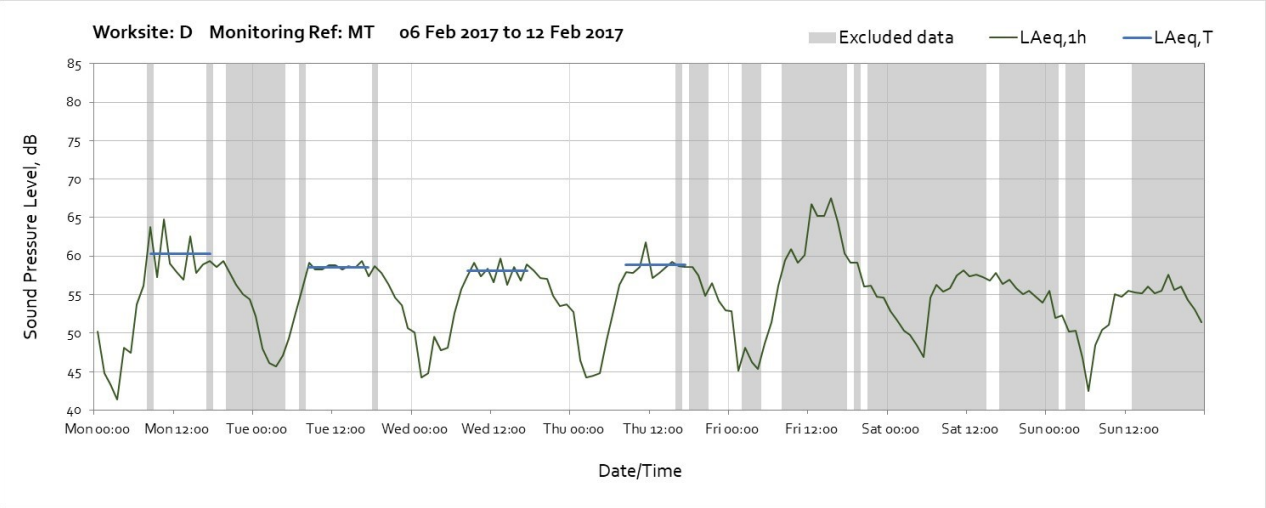


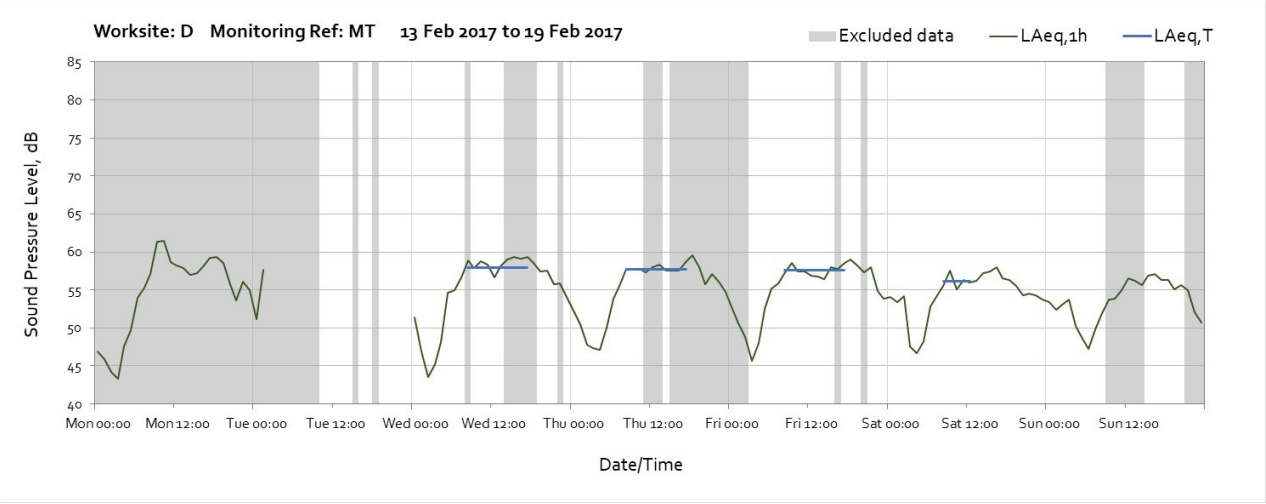


Worksite: D – Monitoring Ref: MT



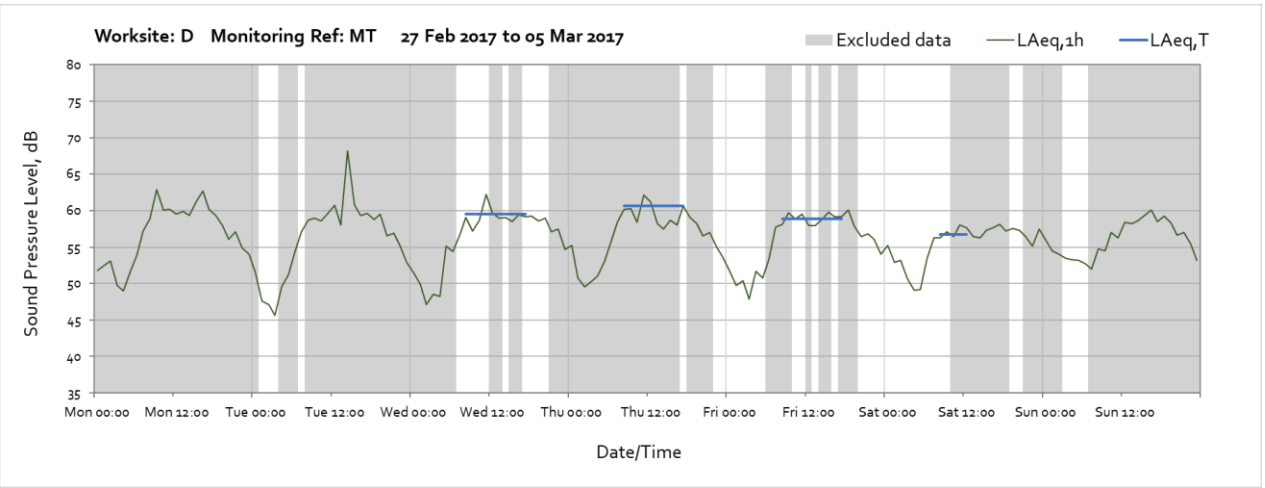
Note – Missing data between 00:00 on Friday 3rd and 00:00 on Sunday 5th of February due to a loss of power at the noise monitor.

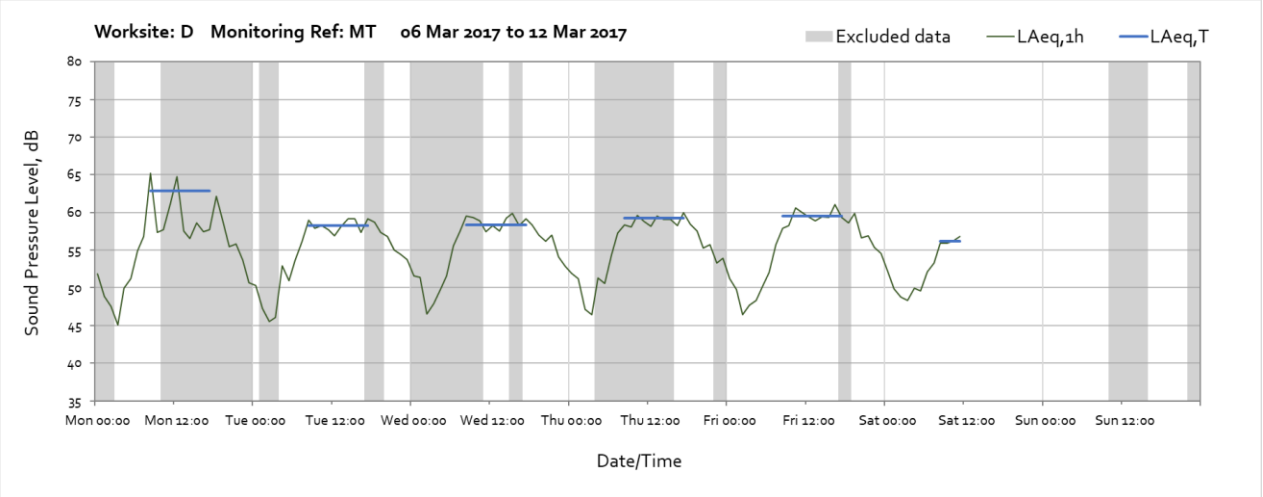




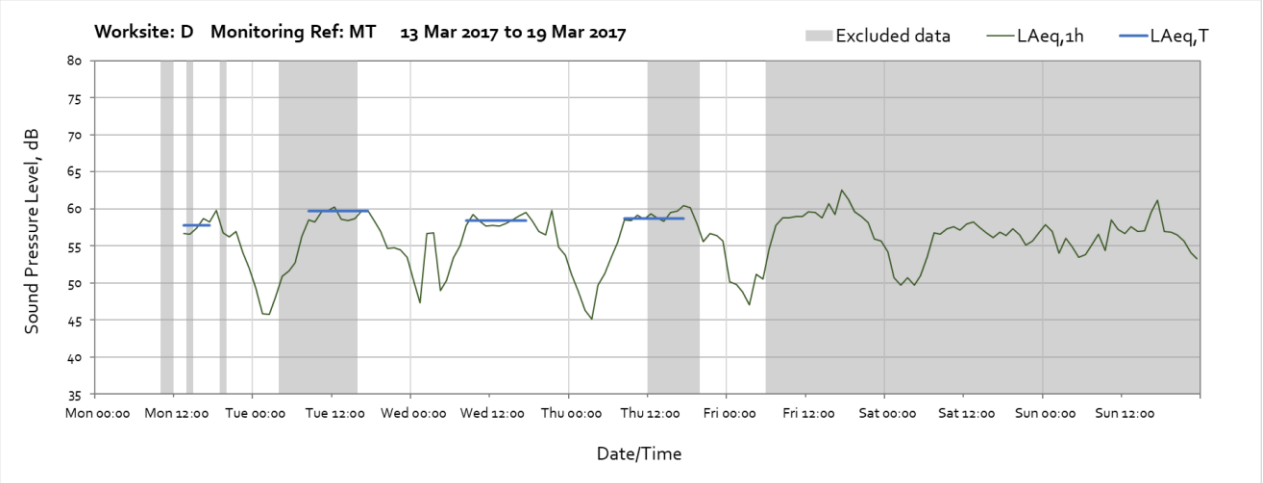
Note – Missing data between 02:00 on Tuesday 14th and 00:00 on Wednesday 15th of February due to a loss of power at the noise monitor.

Note – Missing data between 20:00 on Tuesday 21st and 10:00 on Wednesday 22nd of February due to a loss of power at the noise monitor.

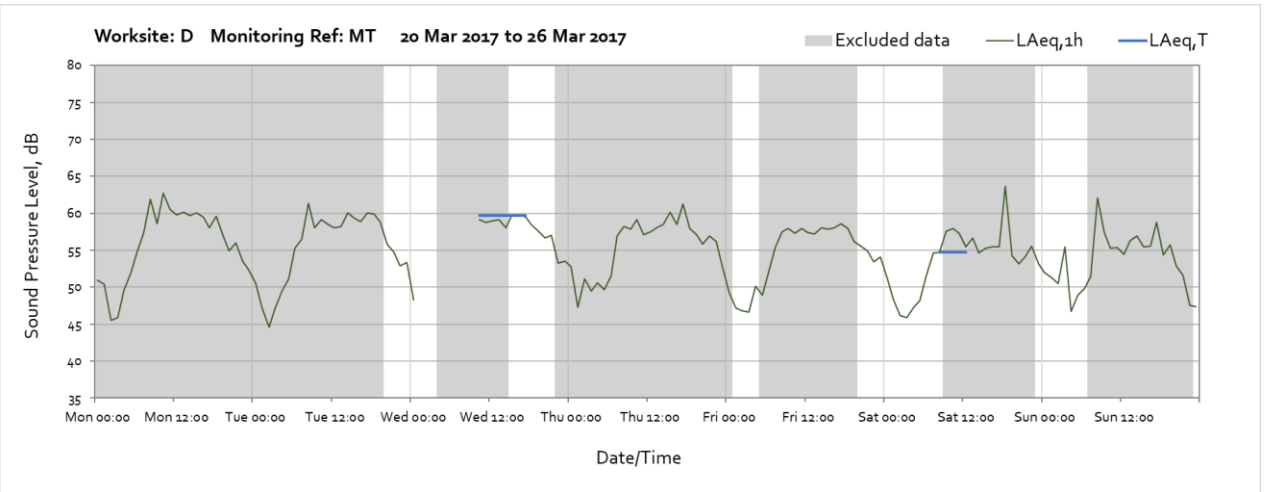




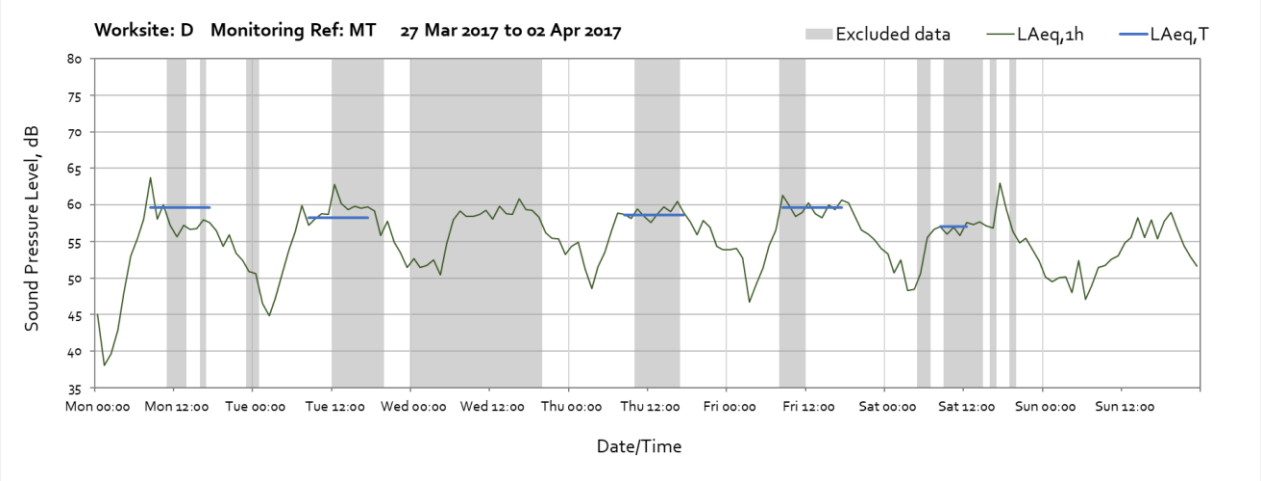
Note – Missing data between 12:00 on Saturday 11th and 13:00 on Monday 13th of March due to a loss of power at the noise monitor.

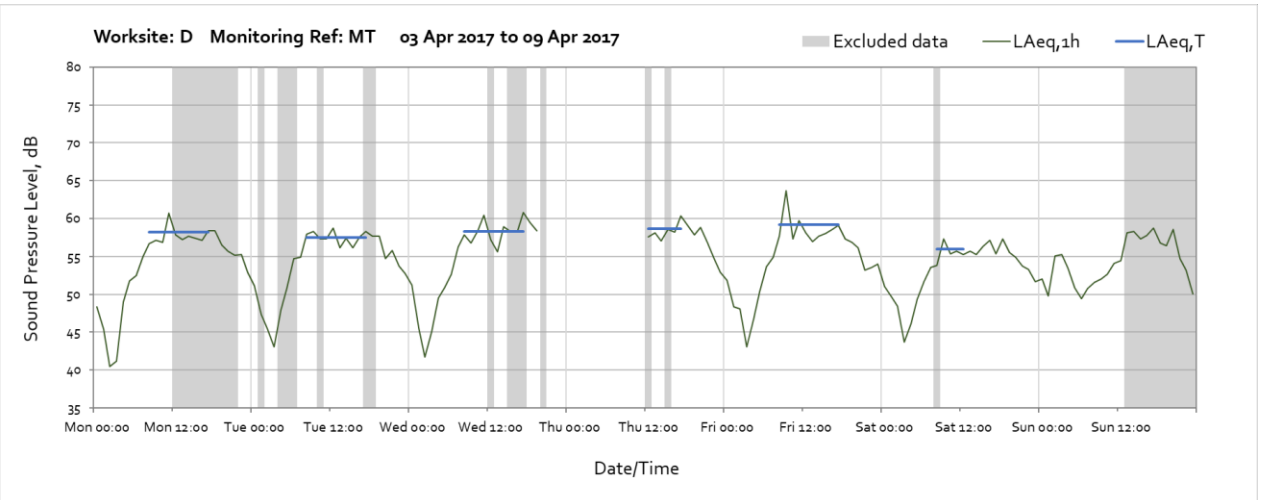


Note – Missing data between 12:00 on Saturday 11th and 13:00 on Monday 13th of March due to a loss of power at the noise monitor.

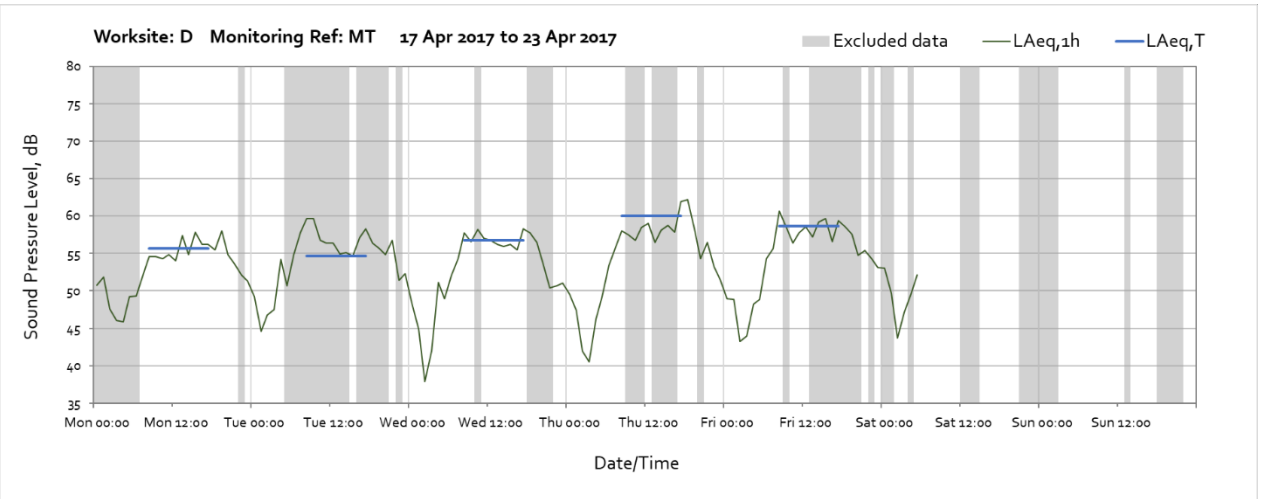


Note – Missing data between 01:00 and 10:00 on Wednesday 22nd of March due to a loss of power at the noise monitor.

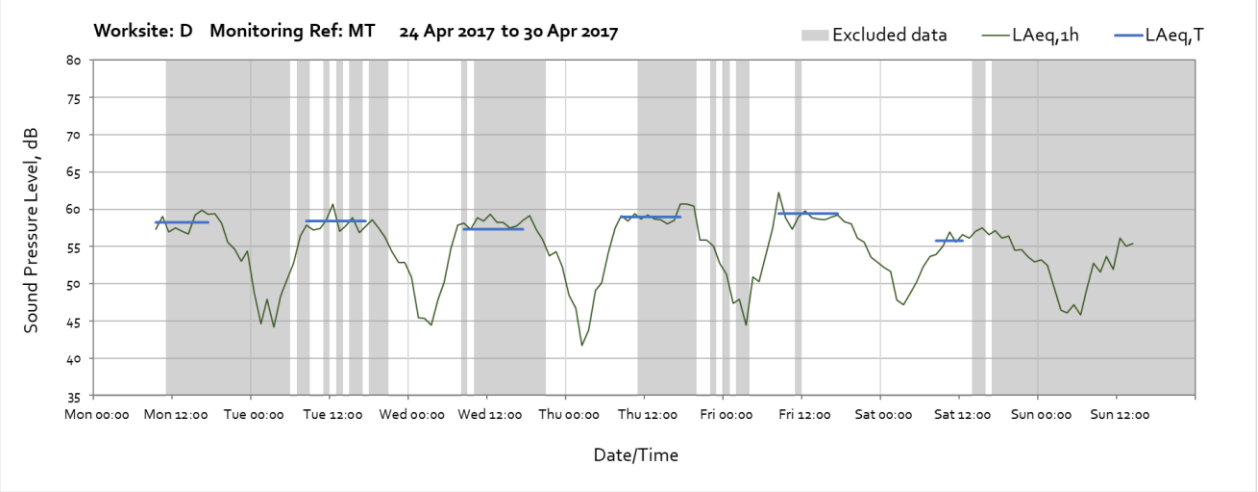




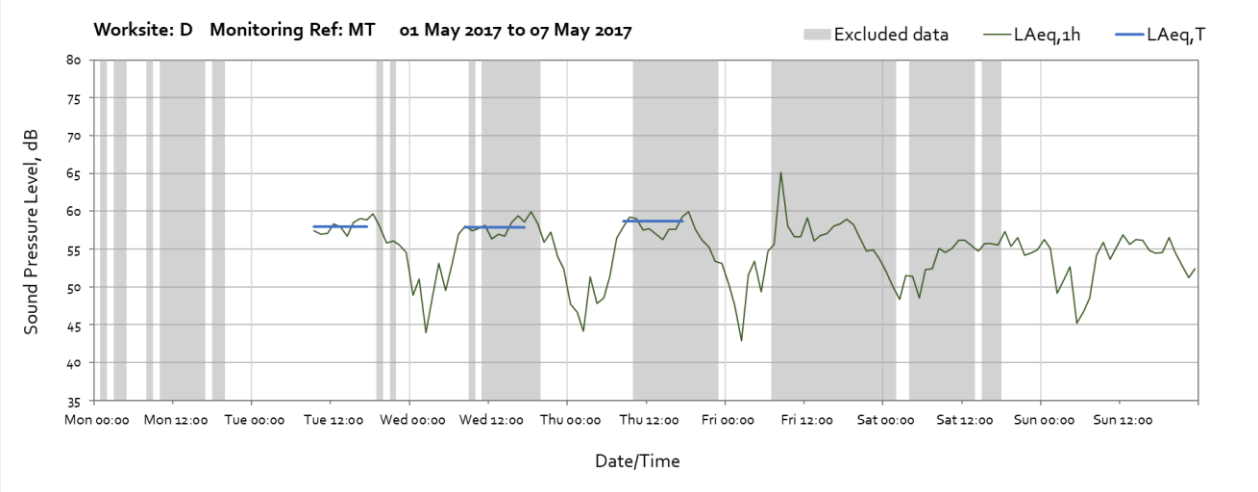
Note – Missing data between 20:00 on Wednesday 5th and 12:00 on Thursday 6th of April due to a loss of power at the noise monitor.



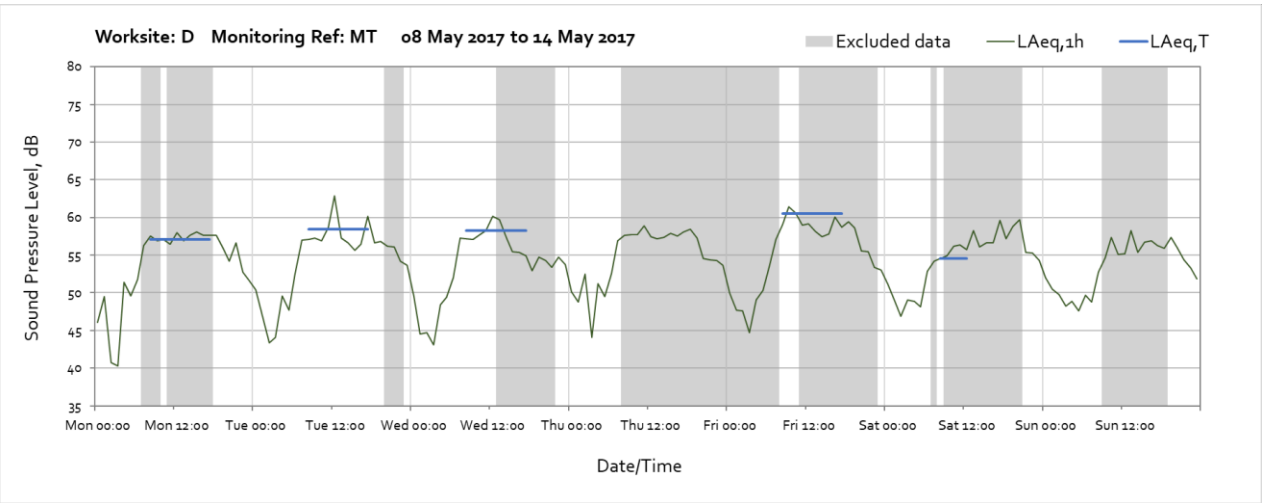
Note – Missing data between 06:00 on Saturday 22nd and 09:00 on Monday 24th of April due to a loss of power at the noise monitor.

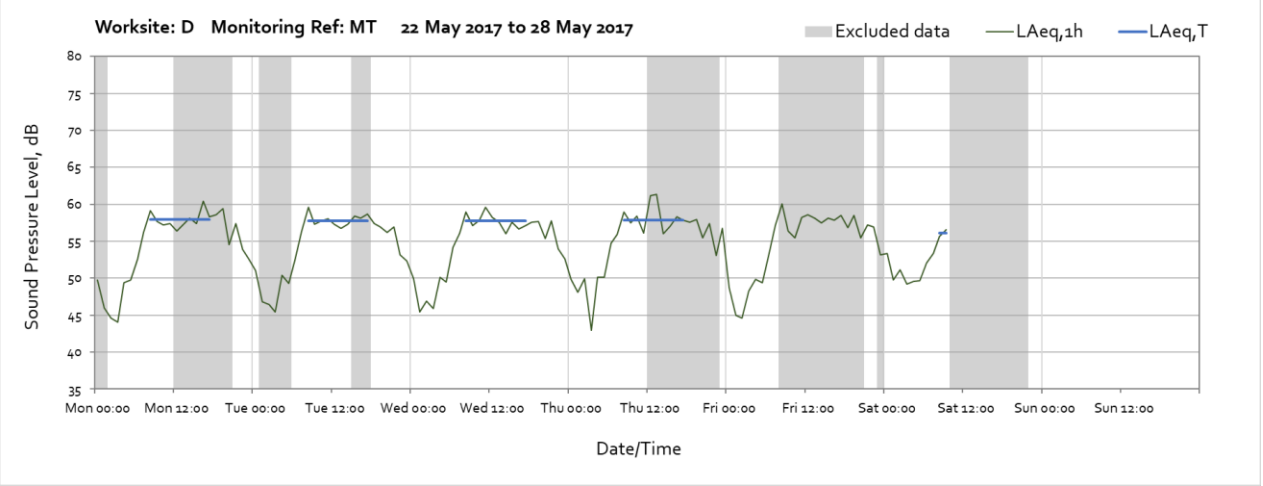


Note – Missing data between 06:00 on Saturday 22nd and 09:00 on Monday 24th of April and between 15:00 on Sunday 30th of April and 09:00 on Tuesday 2nd of May due to a loss of power at the noise monitor.

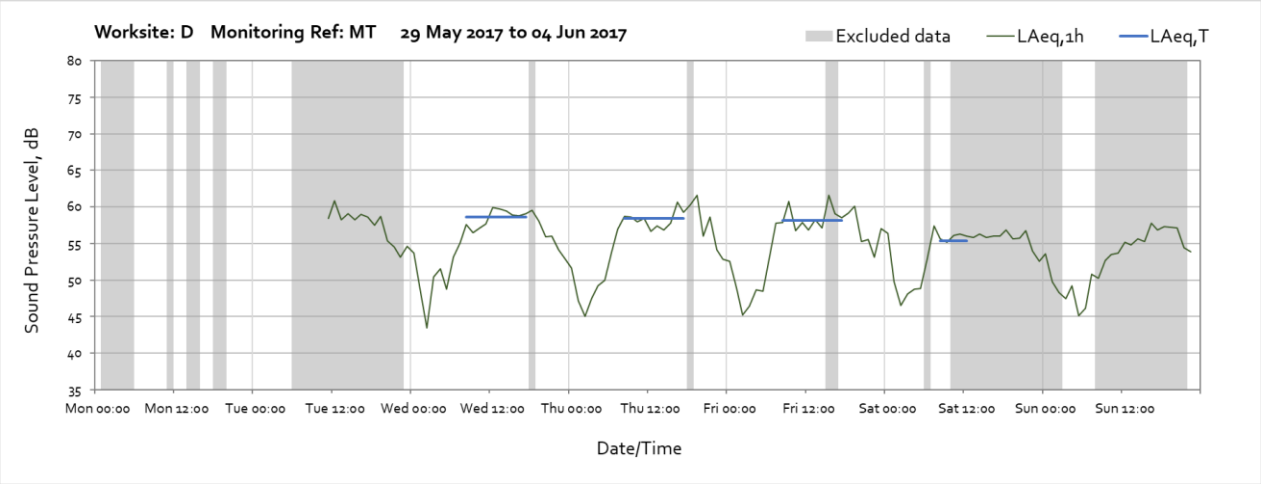


Note – Missing data between 15:00 on Sunday 30th of April and 09:00 on Tuesday 2nd of May due to a loss of power at the noise monitor.

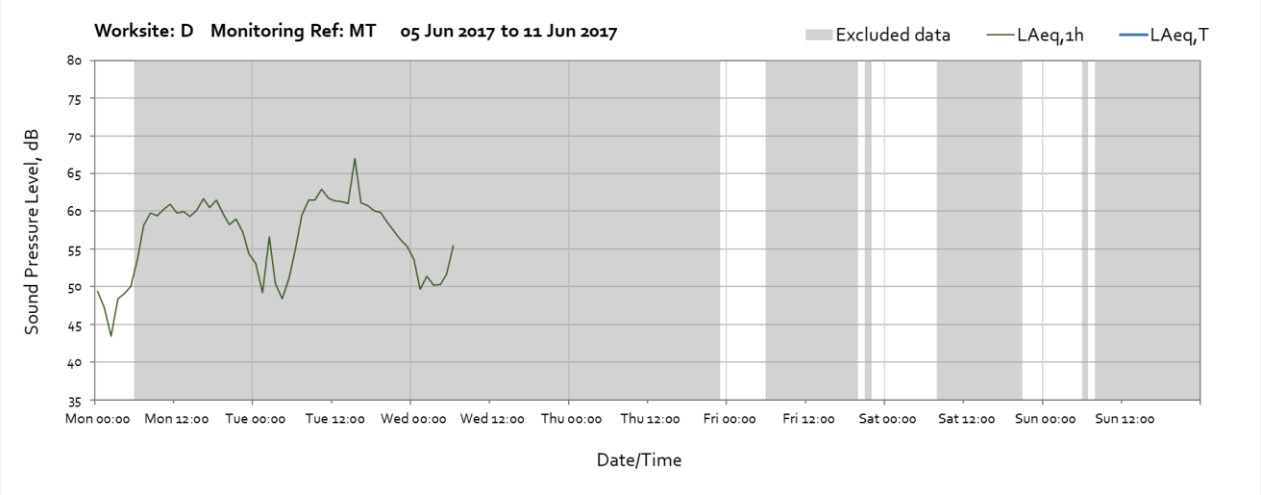




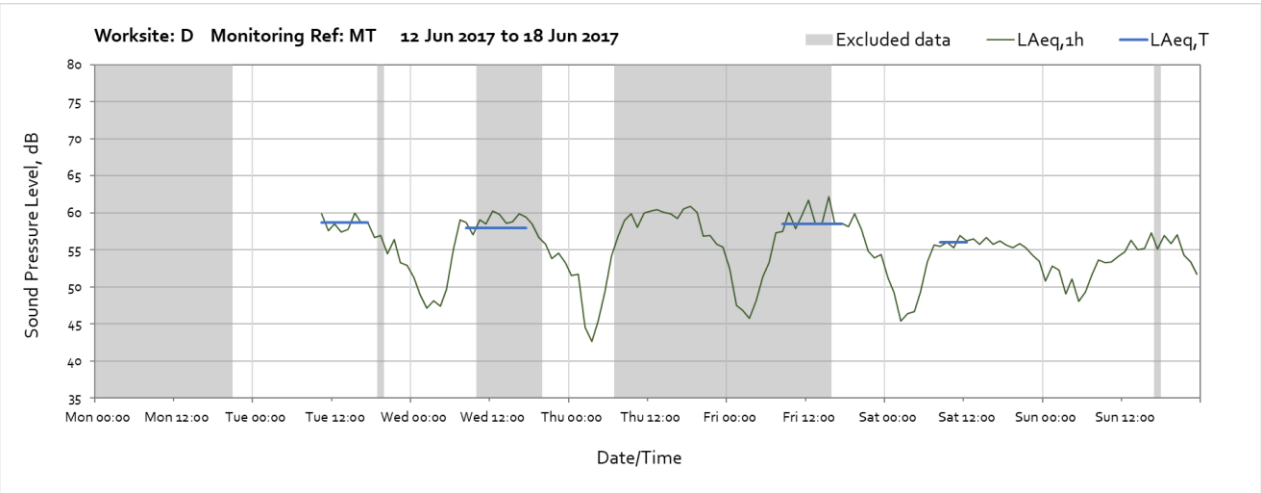
Note – Missing data between 10:00 on Saturday 30th and 11:00 on Tuesday 30th of May due to a loss of power at the noise monitor.



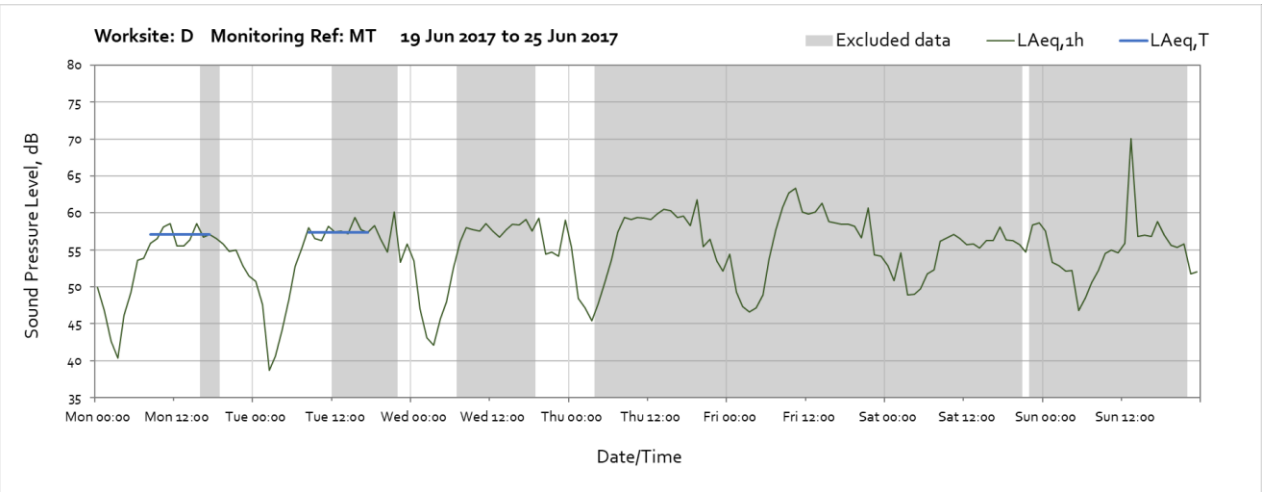
Note – Missing data between 10:00 on Saturday 30th and 11:00 on Tuesday 30th of May due to a loss of power at the noise monitor.

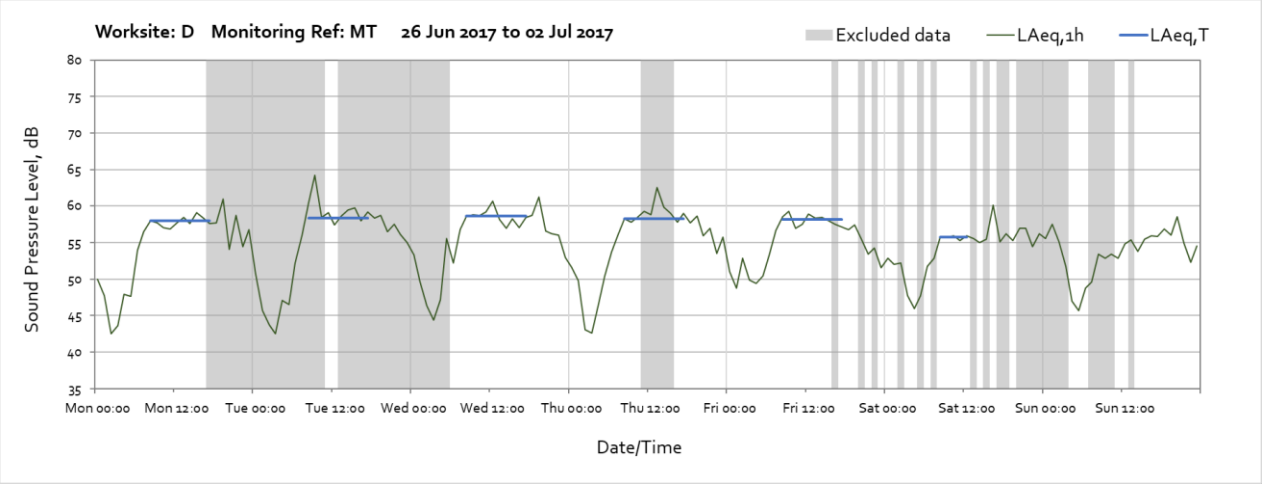


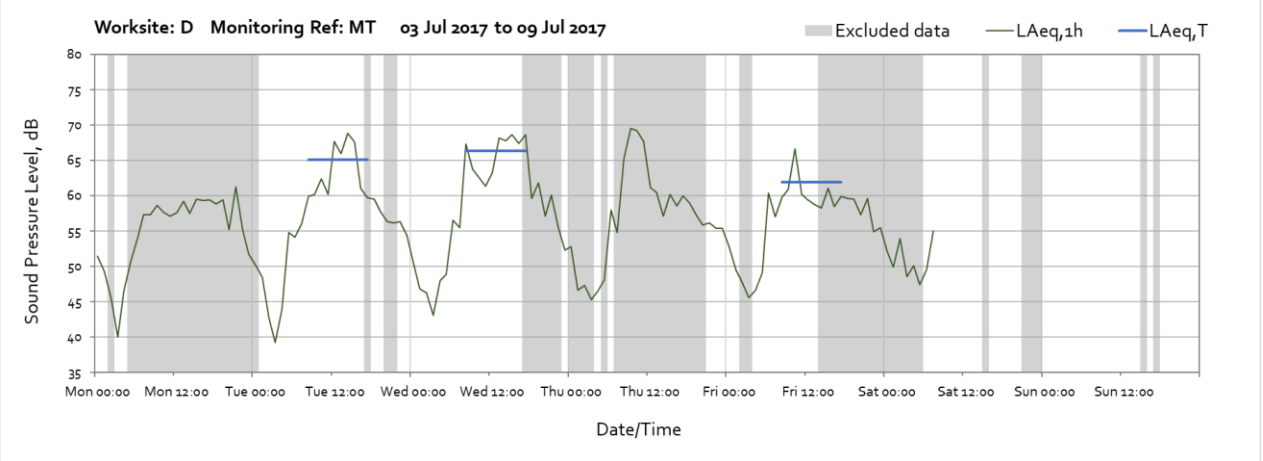
Note – Missing data between 07:00 on Wednesday 7th and 10:00 on Tuesday 13th of June due to a loss of power at the noise monitor.



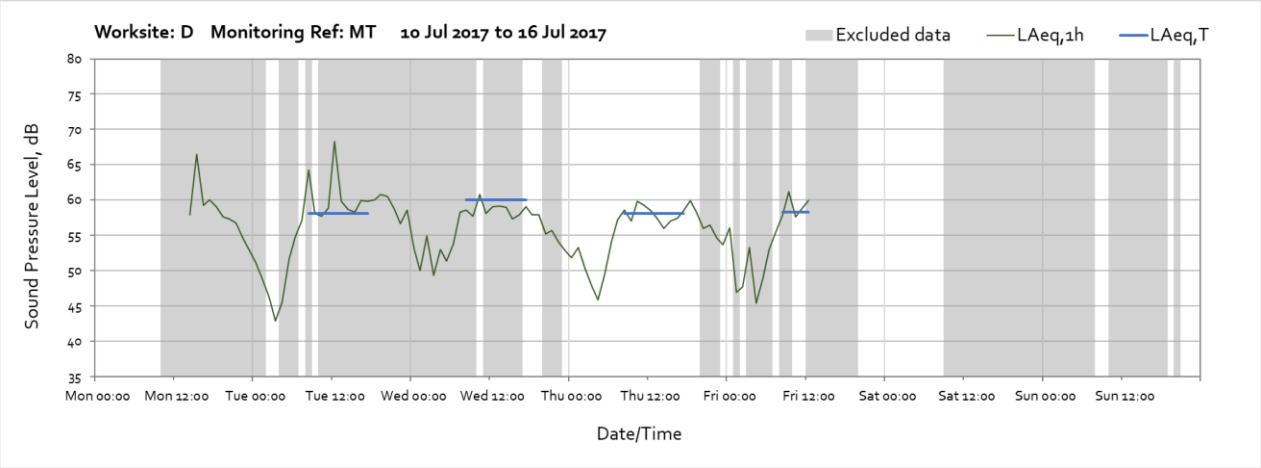
Note – Missing data between 07:00 on Wednesday 7th and 10:00 on Tuesday 13th of June due to a loss of power at the noise monitor.



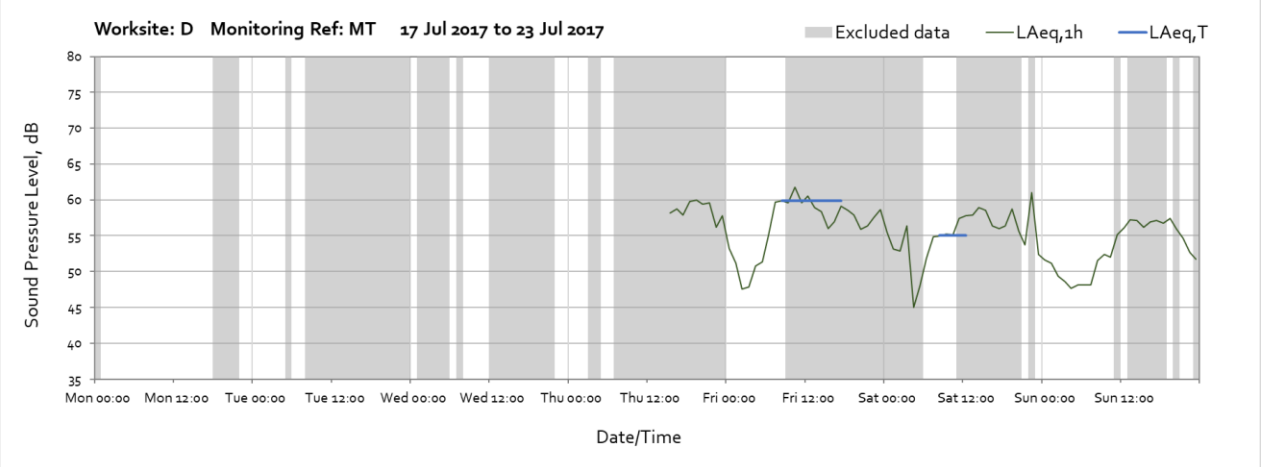




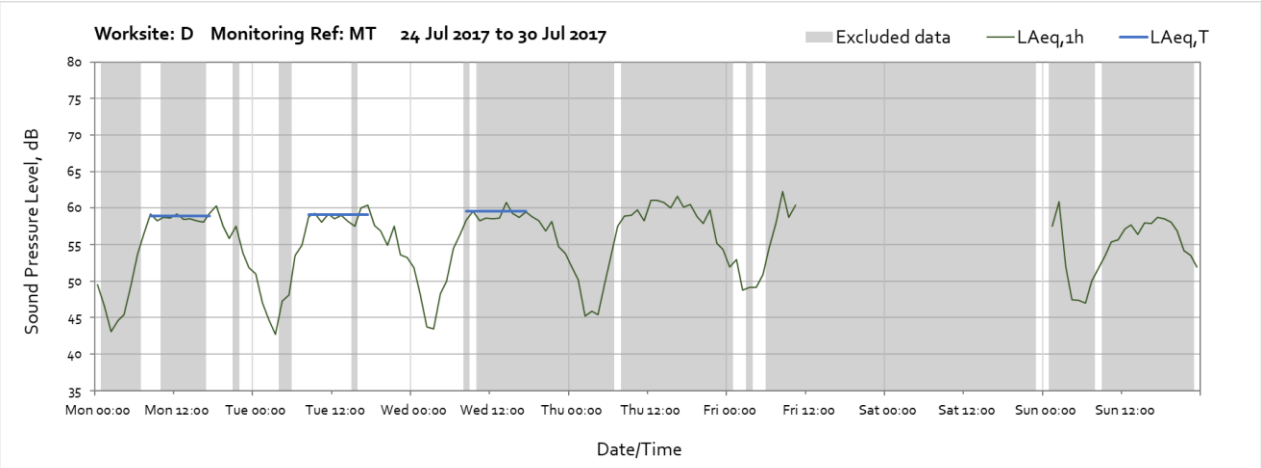
Note – Missing data between 08:00 on Saturday 8th and 14:00 on Monday 10th of July due to a loss of power at the noise monitor.



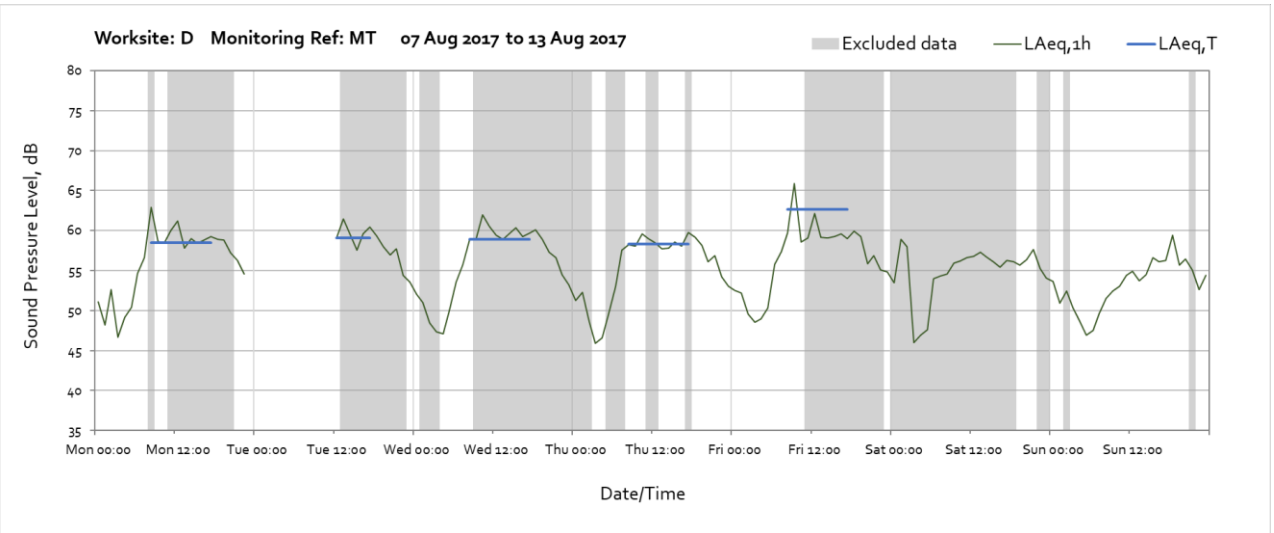
Note – Missing data between 08:00 on Saturday 8th and 14:00 on Monday 10th and between 13:00 on Friday 14th and 15:00 on Thursday 20th of July due to a loss of power at the noise monitor.



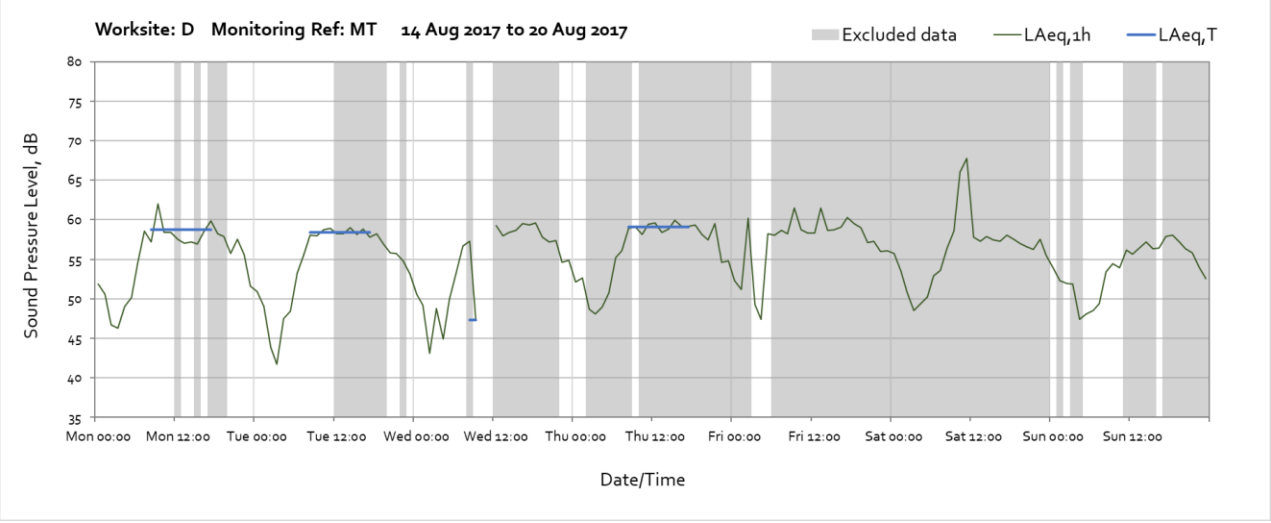
Note – Missing data between 13:00 on Friday 14th and 15:00 on Thursday 20th of July due to a loss of power at the noise monitor.



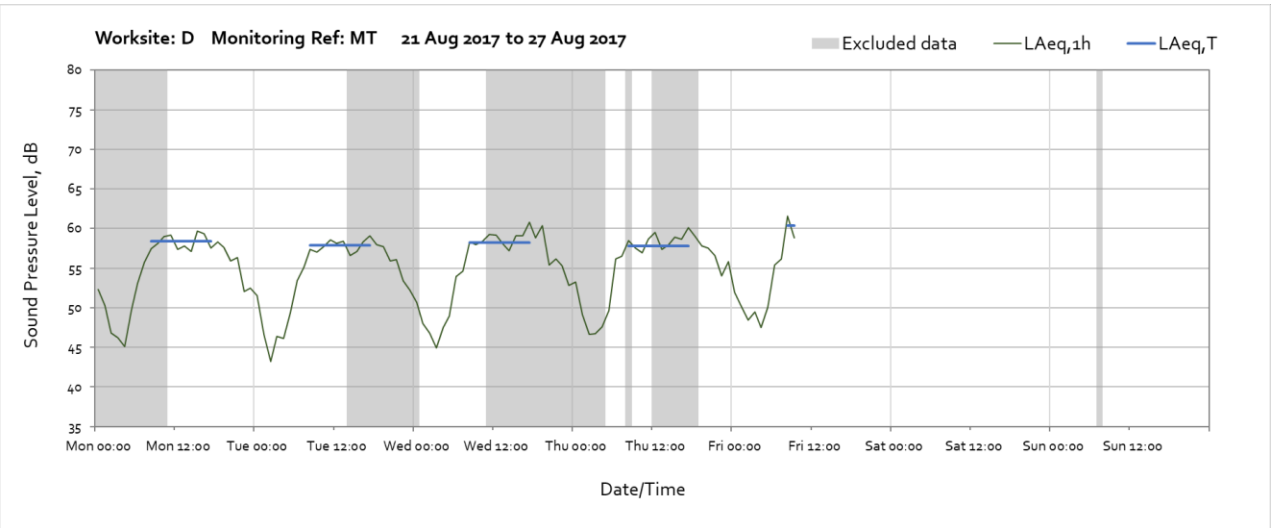
Note – Missing data between 11:00 on Friday 28th and 01:00 on Sunday 30th of July due to a loss of power at the noise monitor.



Note – Missing data between 23:00 on Monday 7th and 12:00 on Tuesday 8th of August due to a loss of power at the noise monitor.

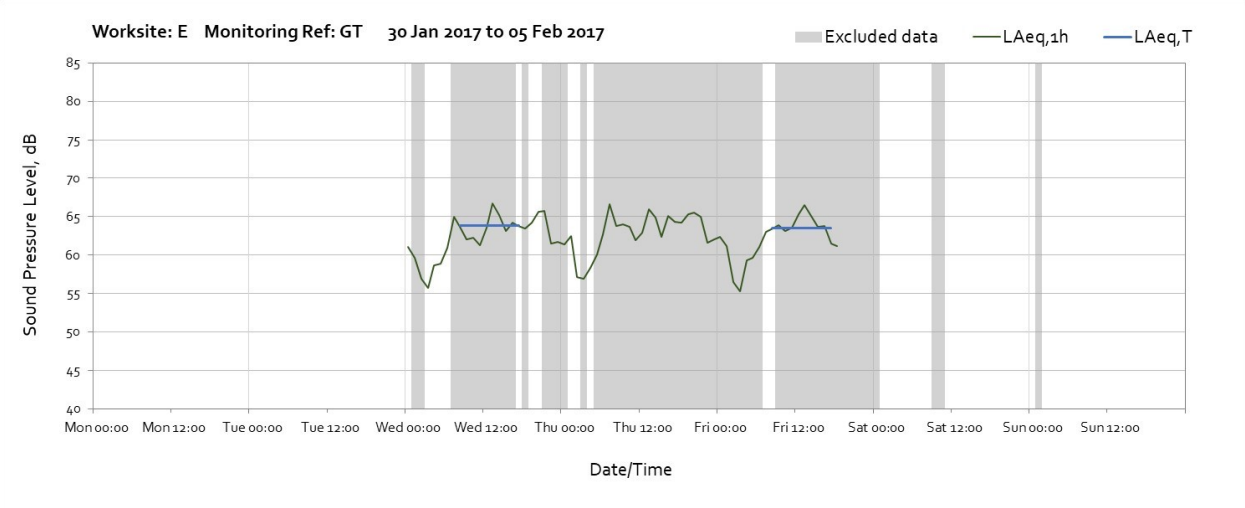


Note – Missing data between 10:00 and 12:00 on Wednesday 16th of August due to a loss of power at the noise monitor.

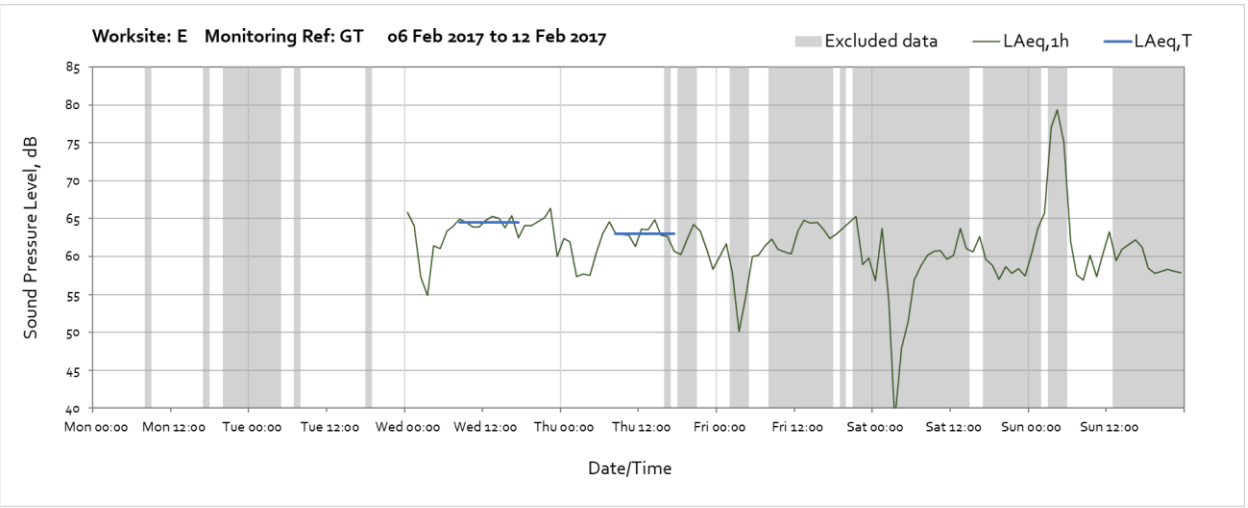


Note – Missing data from 10:00 on Friday 25th of August until the end of the month due to a loss of power at the noise monitor.

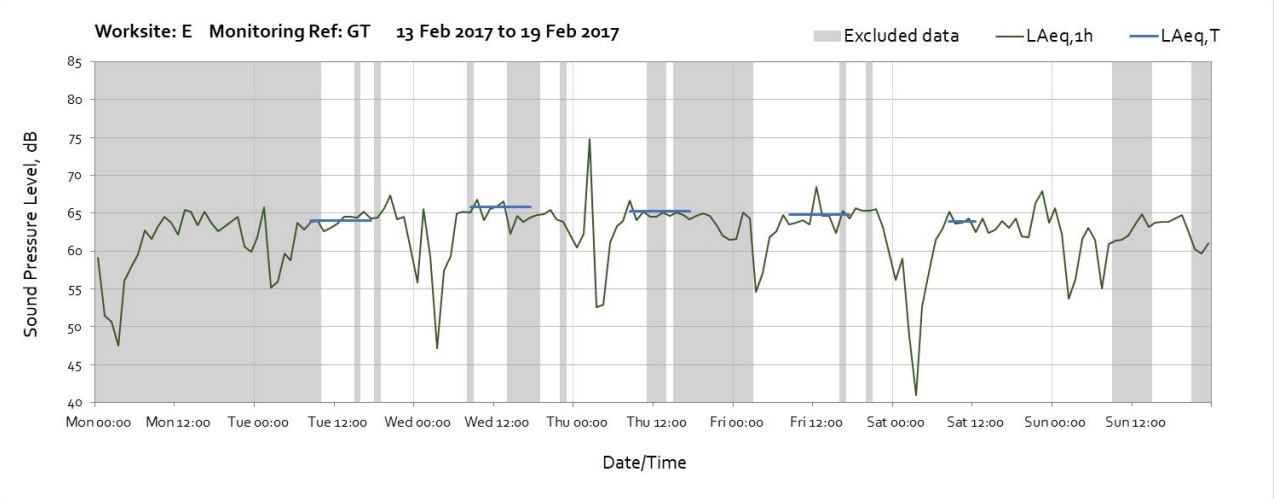
Worksite: E – Monitoring Ref: GT

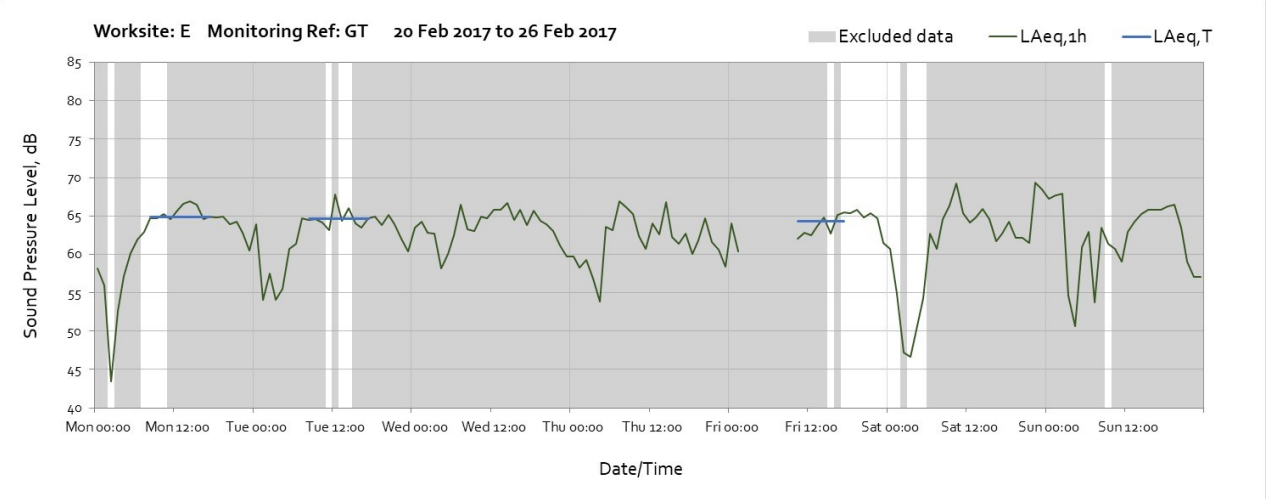


Note – Missing data between 19:00 on Friday 3rd and 00:00 on Wednesday 8th of February due to a loss of power at the noise monitor.

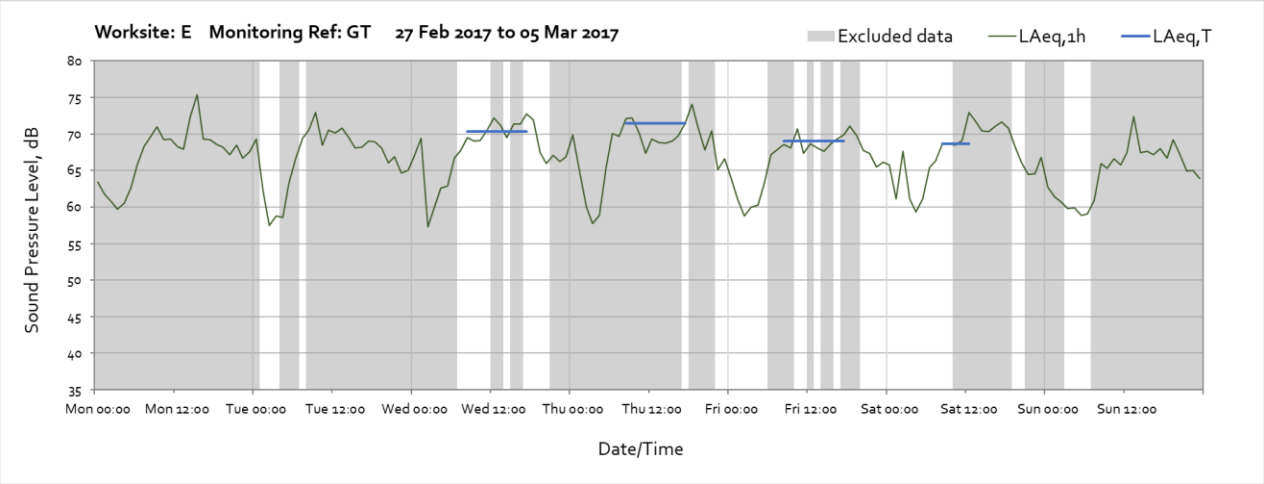


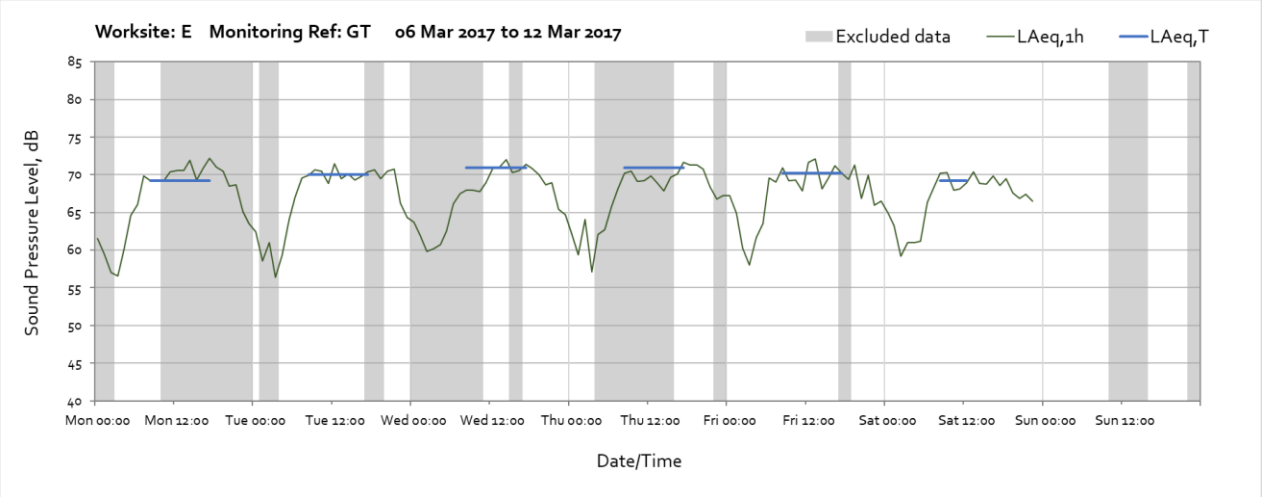
Note – Missing data between 19:00 on Friday 3rd and 00:00 on Wednesday 8th of February due to a loss of power at the noise monitor.



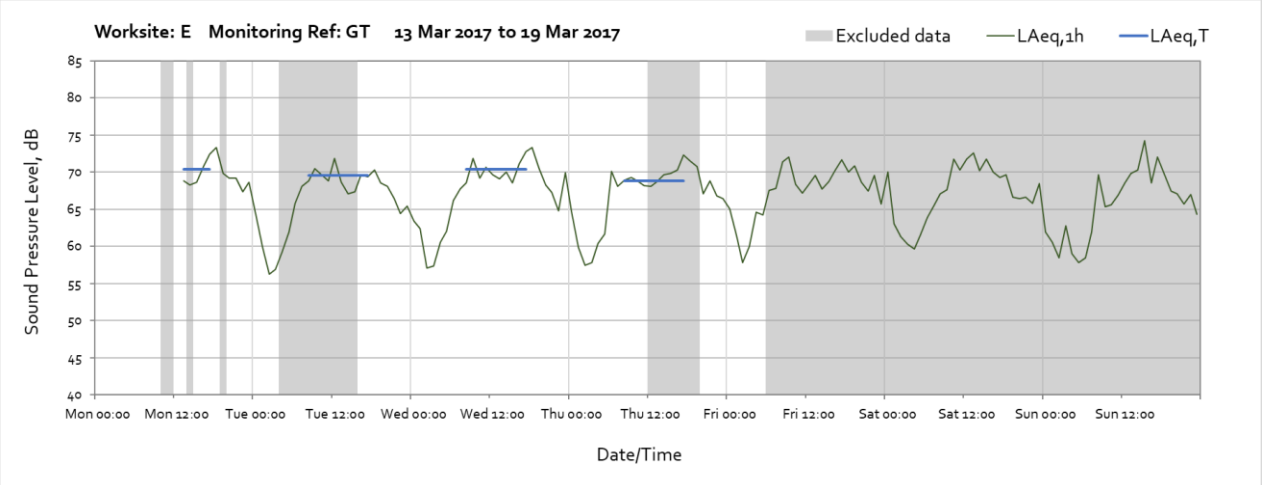


Note – Missing data between 02:00 and 10:00 on Friday 20th of February due to a loss of power at the noise monitor.

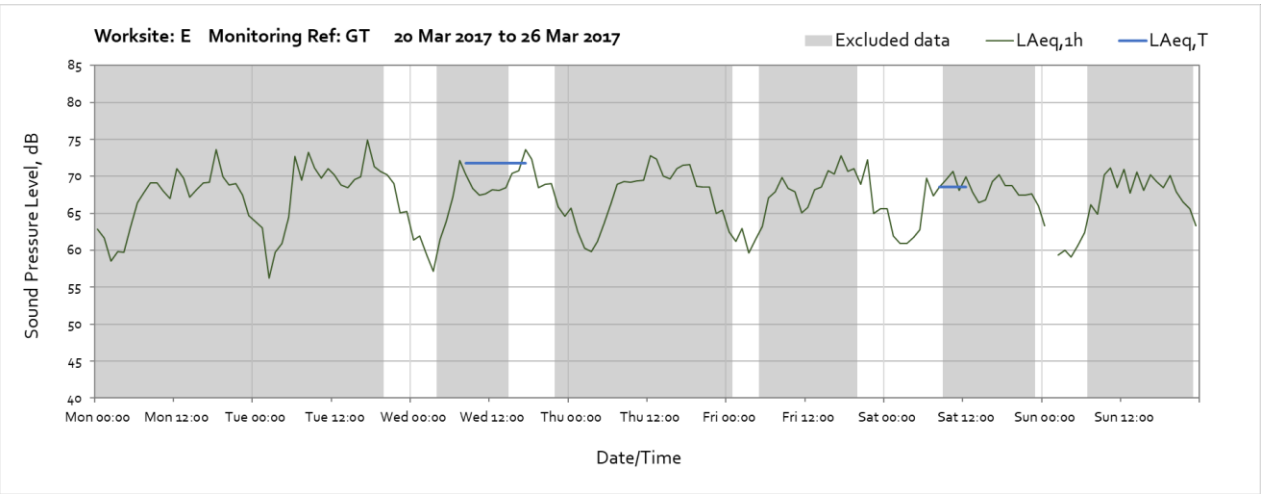




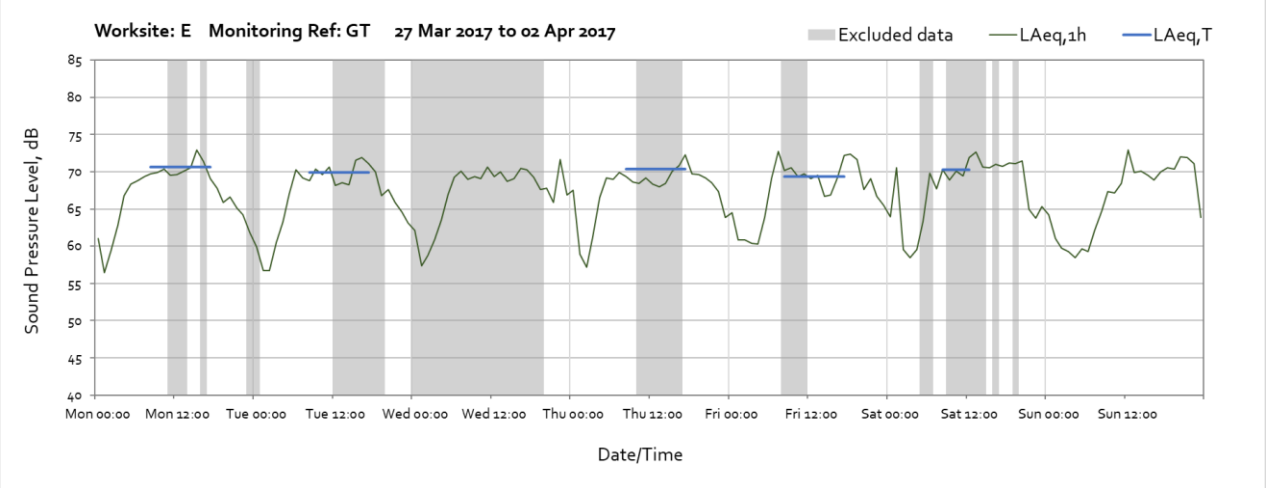
Note – Missing data between 23:00 on Saturday 11th and 13:00 on Monday 13th of March due to a loss of power at the noise monitor.

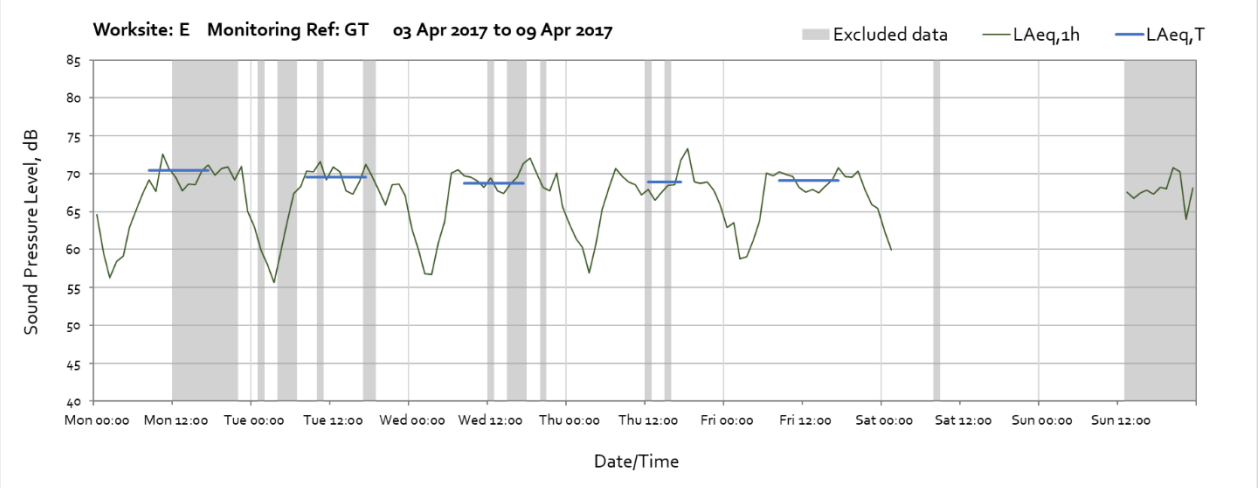


Note – Missing data between 23:00 on Saturday 11th and 13:00 on Monday 13th of March due to a loss of power at the noise monitor.

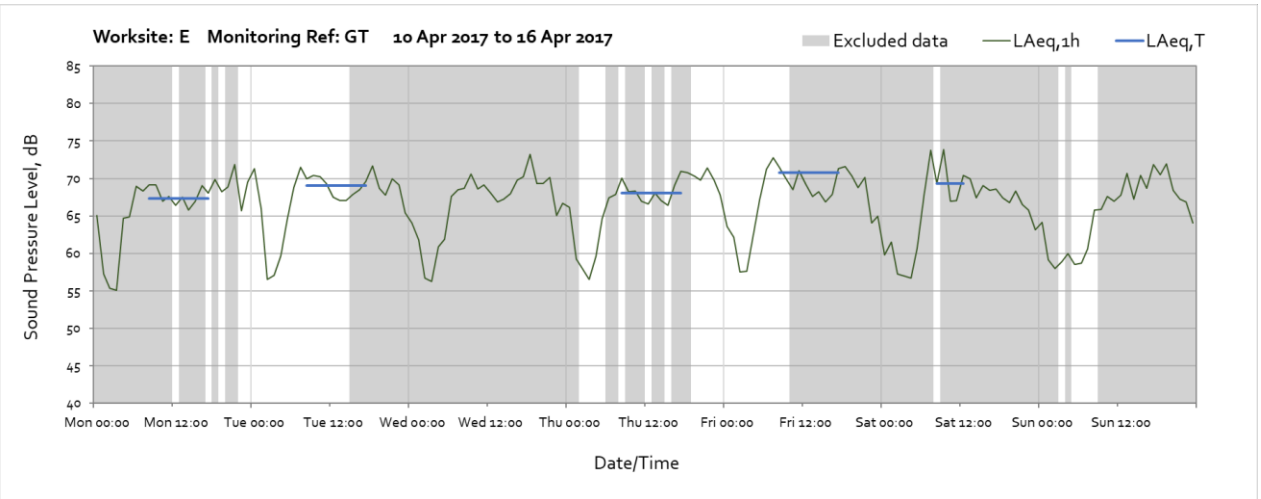


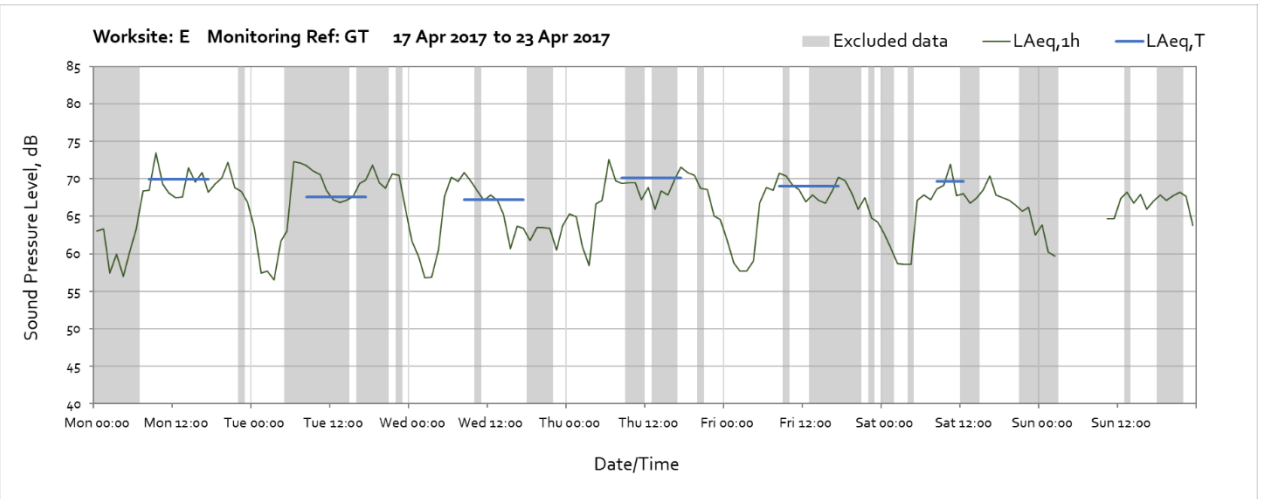
Note – Missing data at 01:00 on Sunday 26th of March due to a loss of power at the noise monitor.



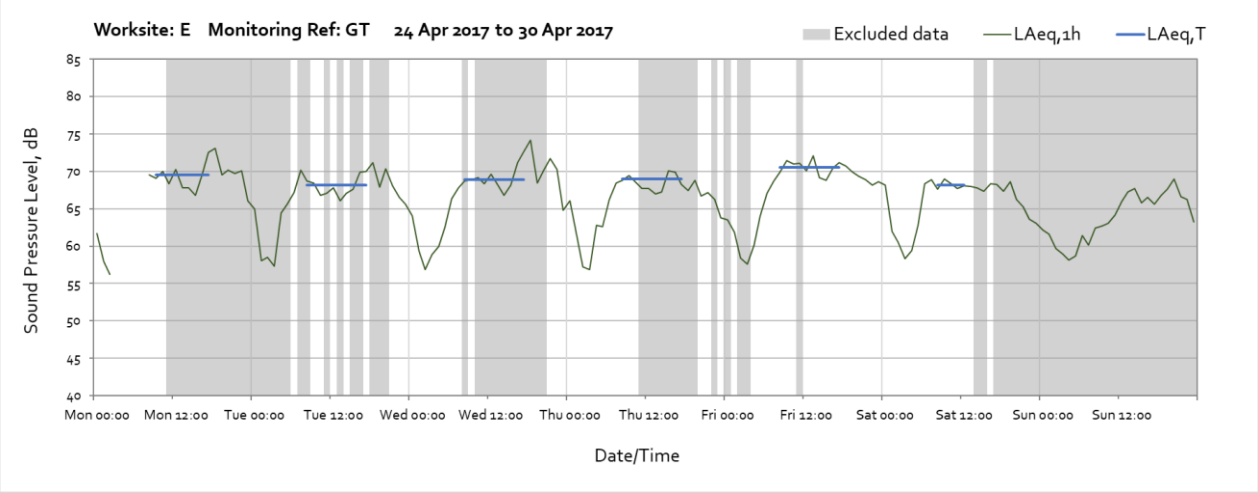


Note – Missing data between 02:00 on Saturday 8th and 13:00 on Sunday 9th of April due to a loss of power at the noise monitor.

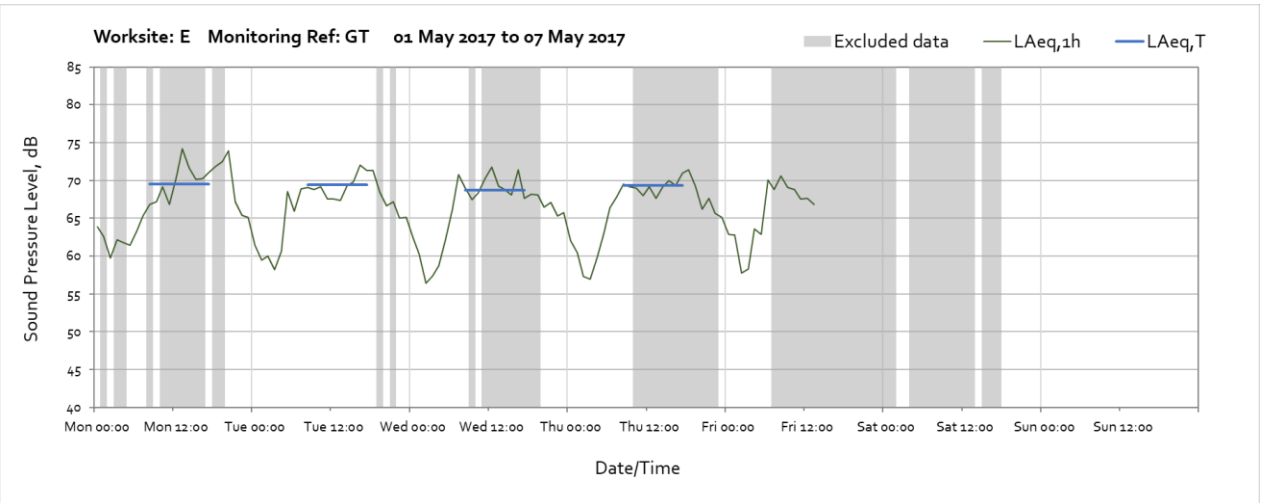




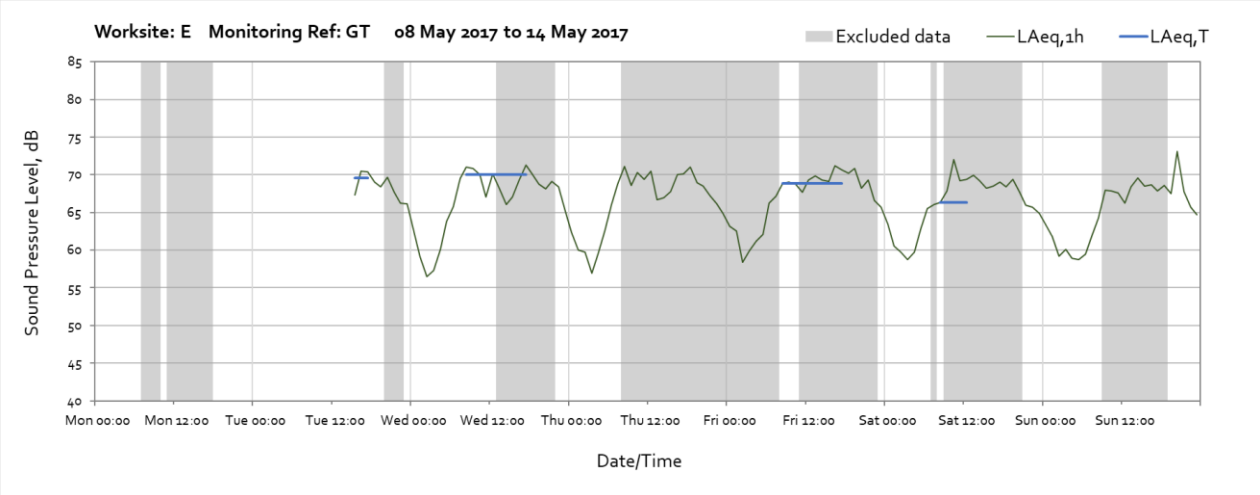
Note – Missing data between 03:00 and 10:00 on Saturday 23rd of April due to a loss of power at the noise monitor.



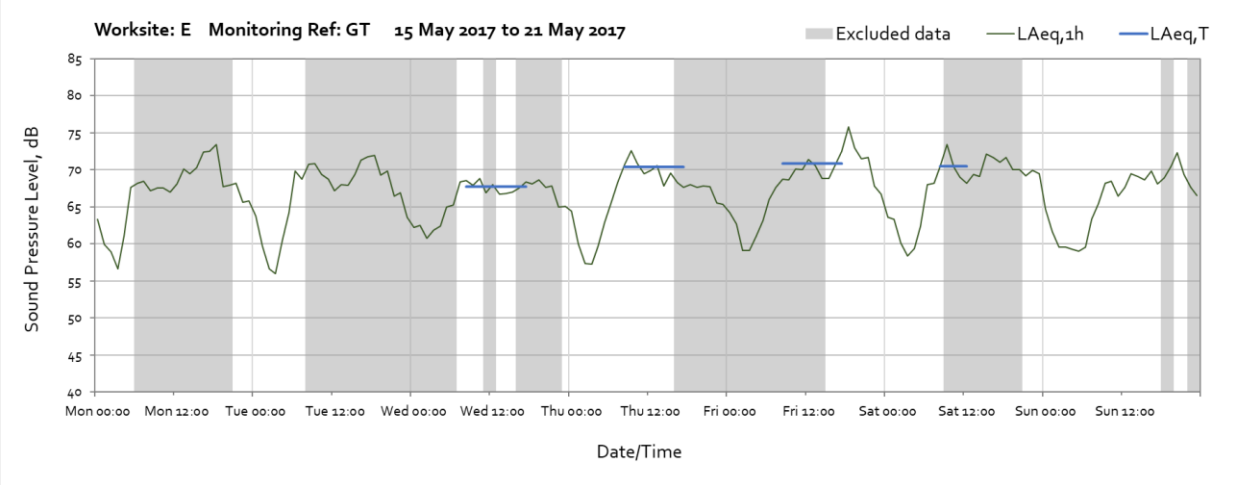
Note – Missing data between 03:00 and 08:00 on Monday 24th of April due to a loss of power at the noise monitor.

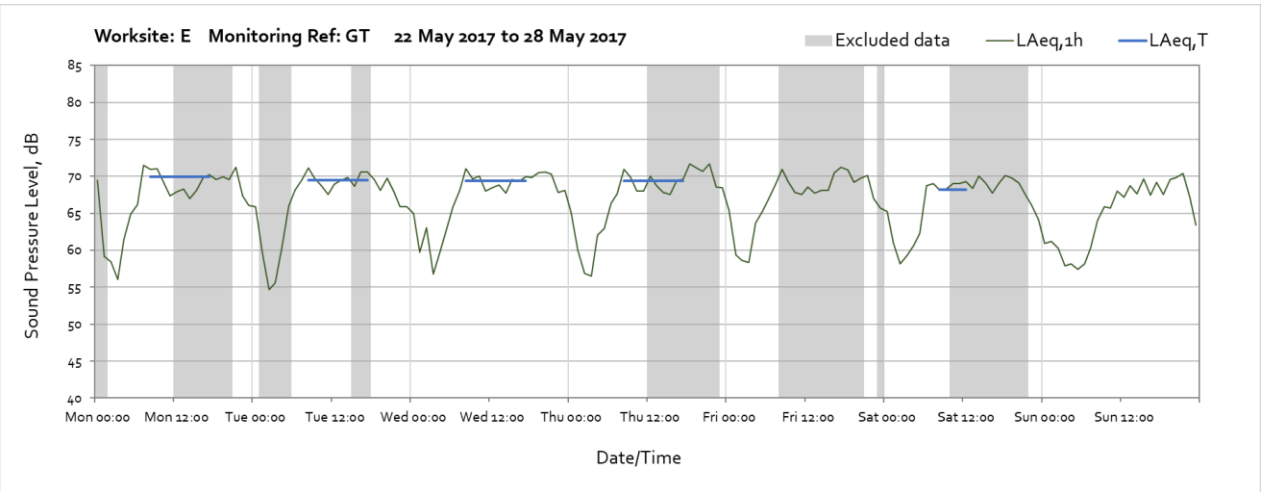


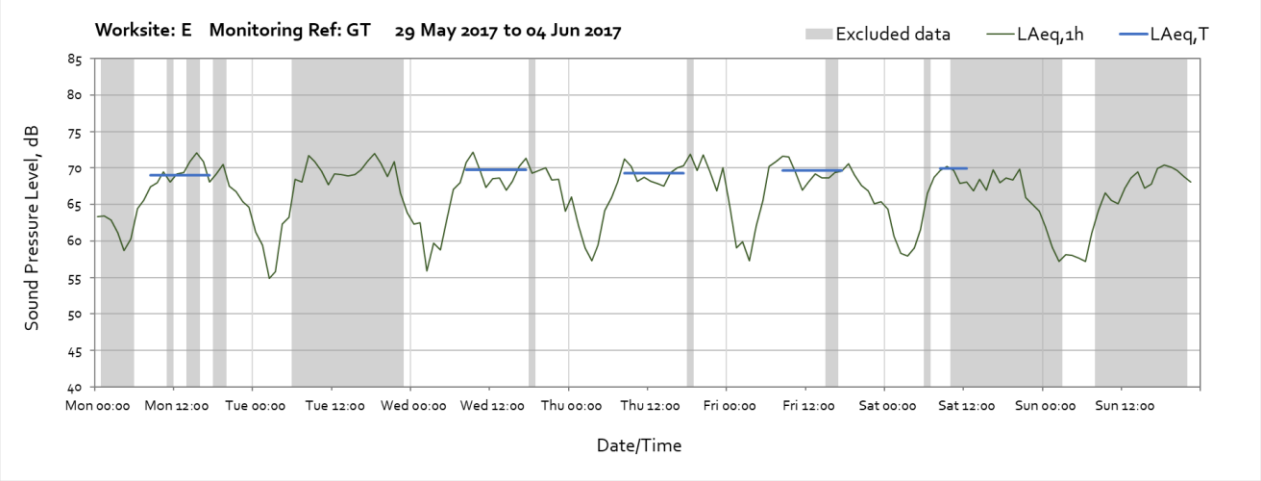
Note – Missing data between 14:00 on Friday 5th and 15:00 on Tuesday 9th of May due to a loss of power at the noise monitor.

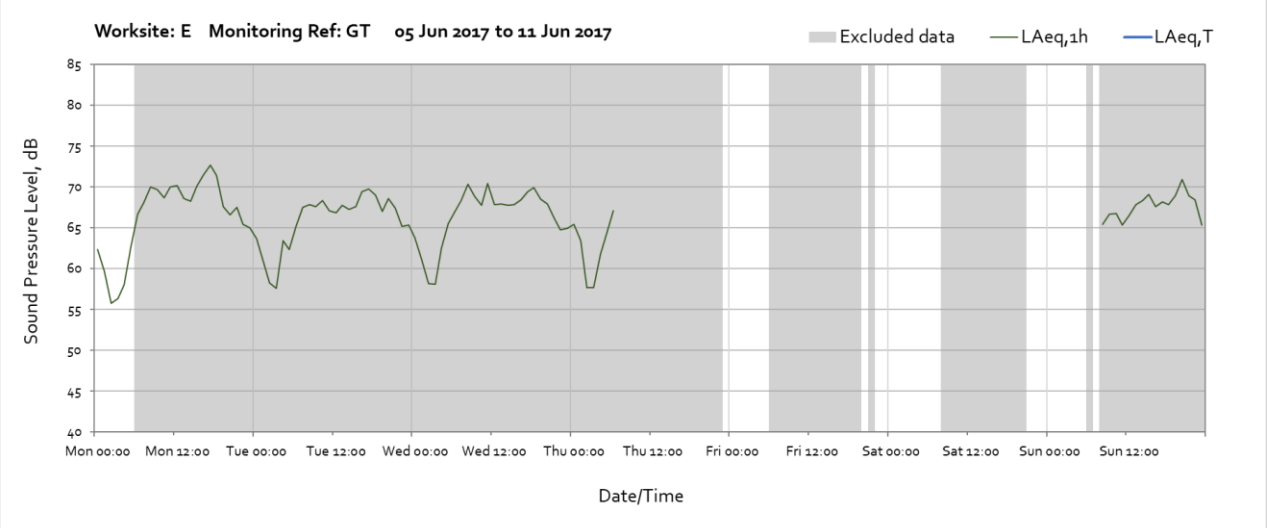


Note – Missing data between 14:00 on Friday 5th and 15:00 on Tuesday 9th of May due to a loss of power at the noise monitor.

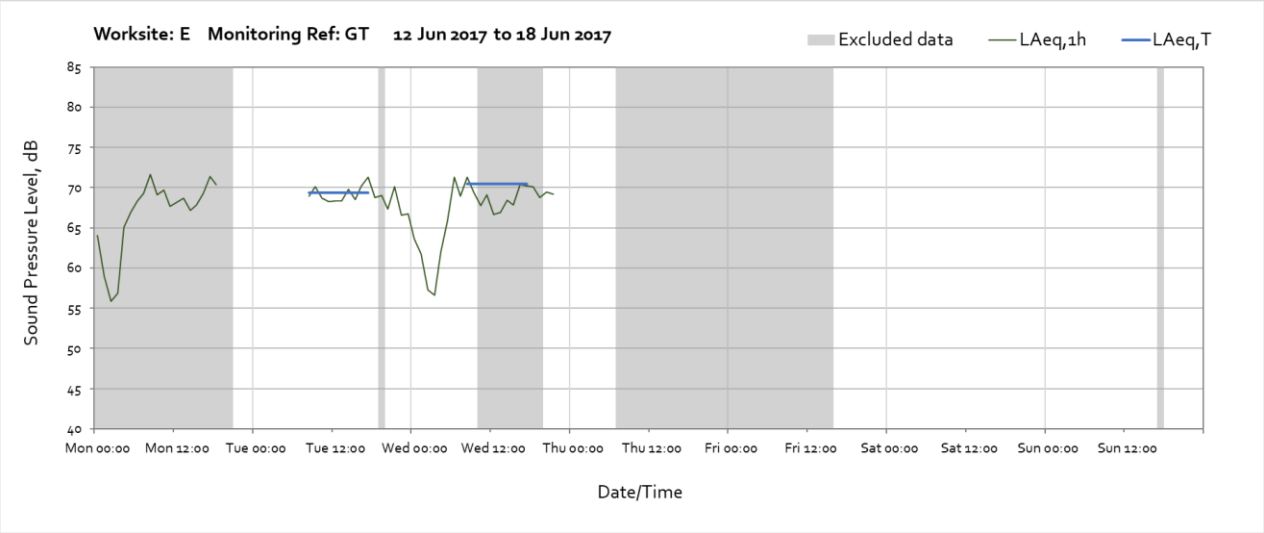




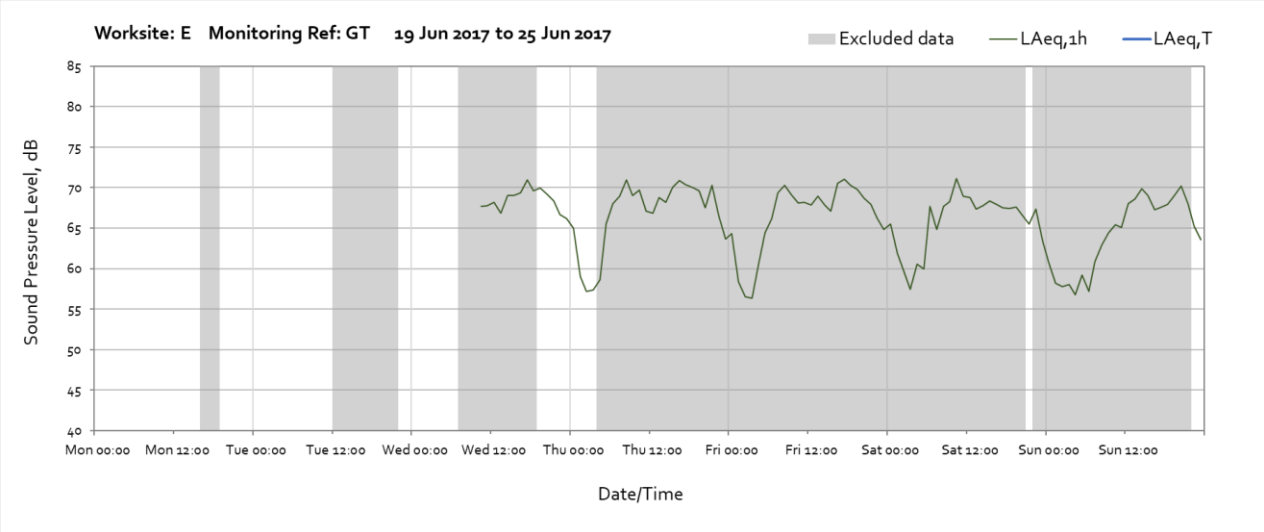




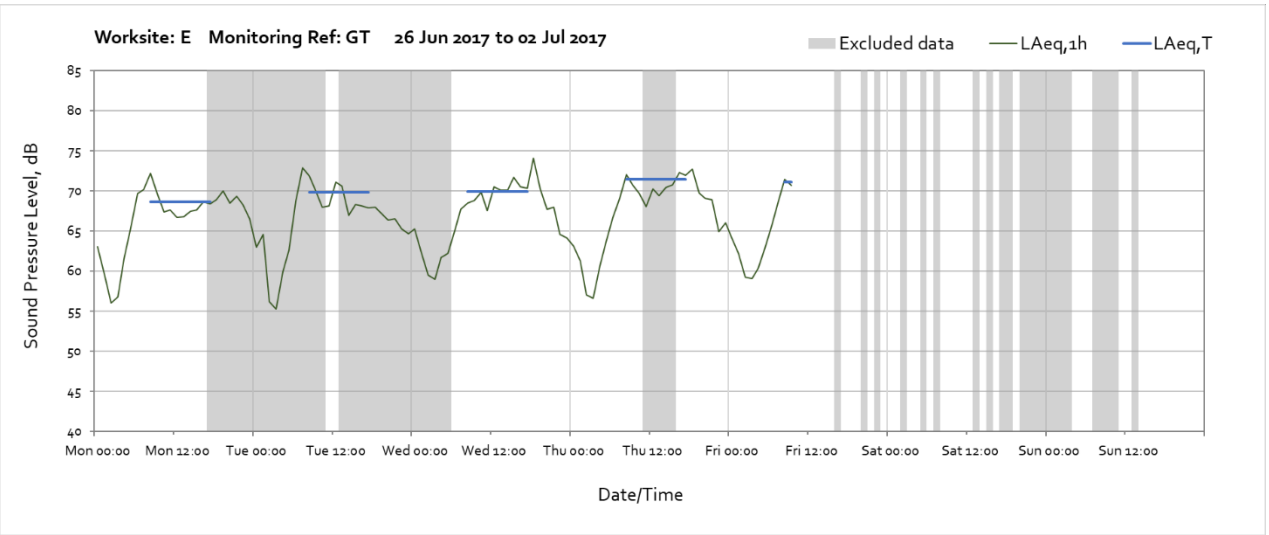
Note – Missing data between 07:00 on Thursday 8th and 08:00 on Sunday 11th of June due to a loss of power at the noise monitor.



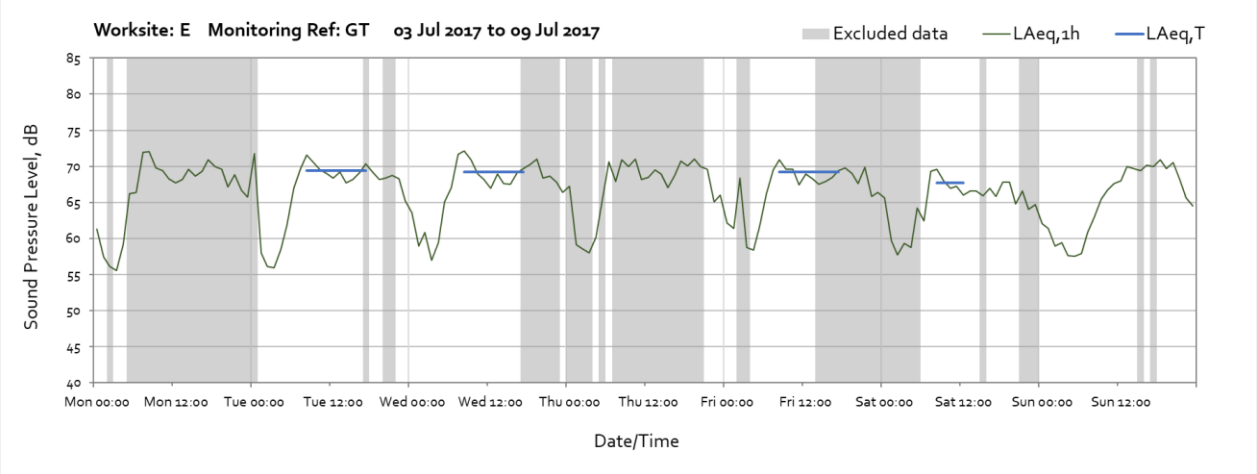
Note – Missing data between 19:00 on Monday 12th and 08:00 on Tuesday 13th and between 22:00 on Wednesday 14th and 10:00 on Wednesday 21st of June due to a loss of power at the noise monitor.

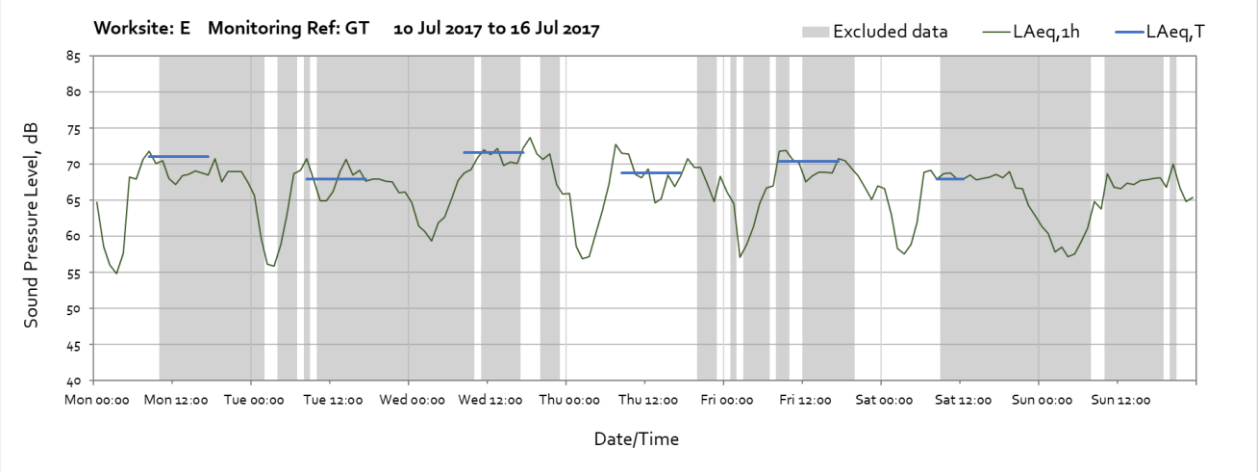


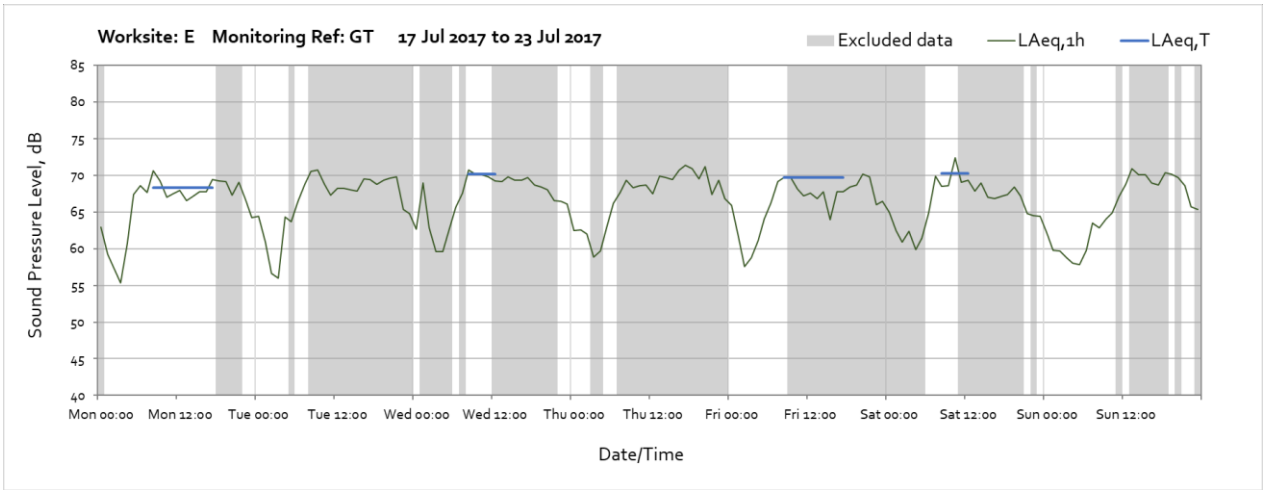
Note – Missing data between 22:00 on Wednesday 14th and 10:00 on Wednesday 21st of June due to a loss of power at the noise monitor.



Note – Missing data between 10:00 on Friday 30th of June and 00:00 on Monday 3rd of July due to a loss of power at the noise monitor.






Worksite: E Monitoring Ref: GT 17 Jul 2017 to 23 Jul 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
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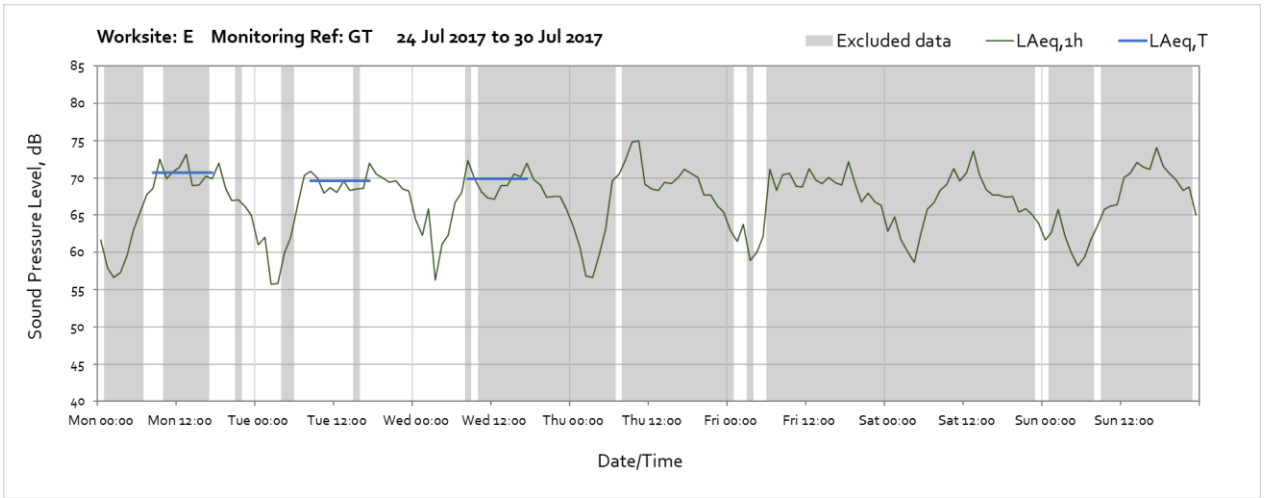
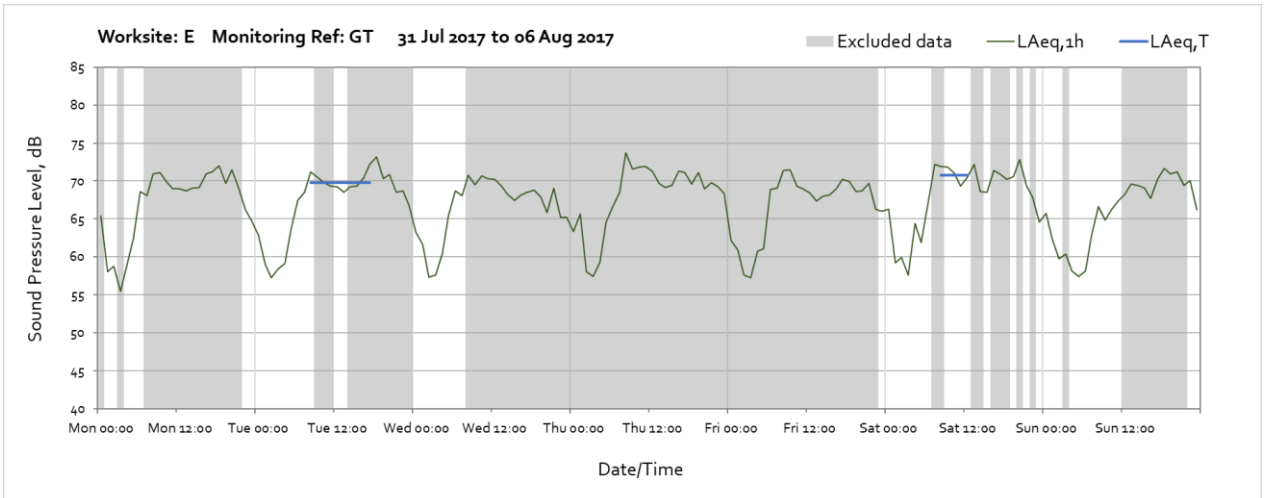
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: E Monitoring Ref: GT 24 Jul 2017 to 30 Jul 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: E Monitoring Ref: GT 31 Jul 2017 to 06 Aug 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
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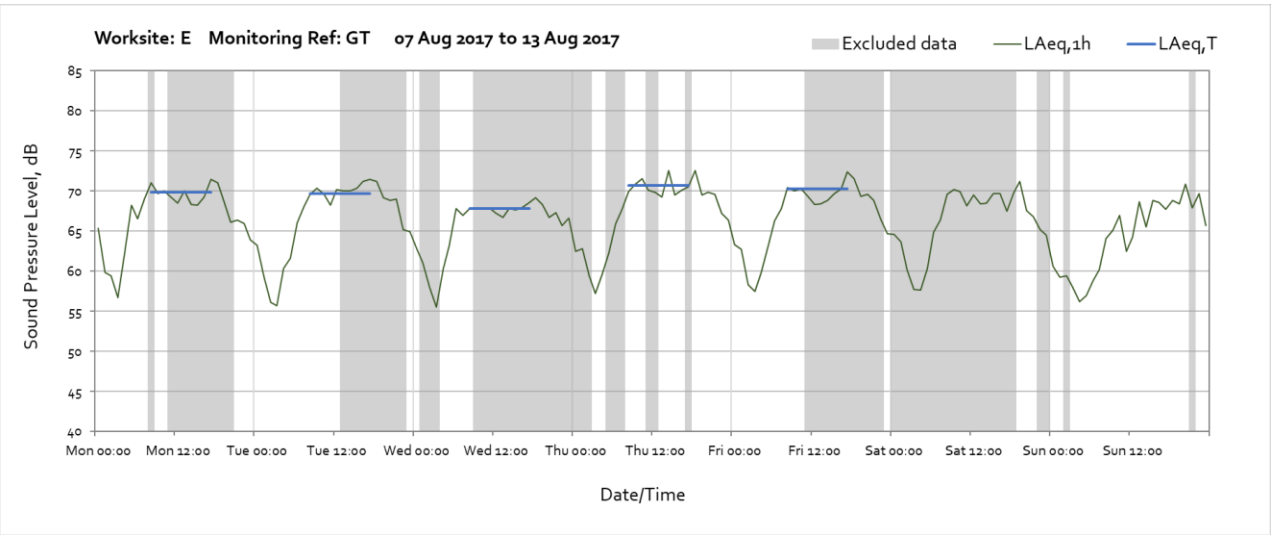
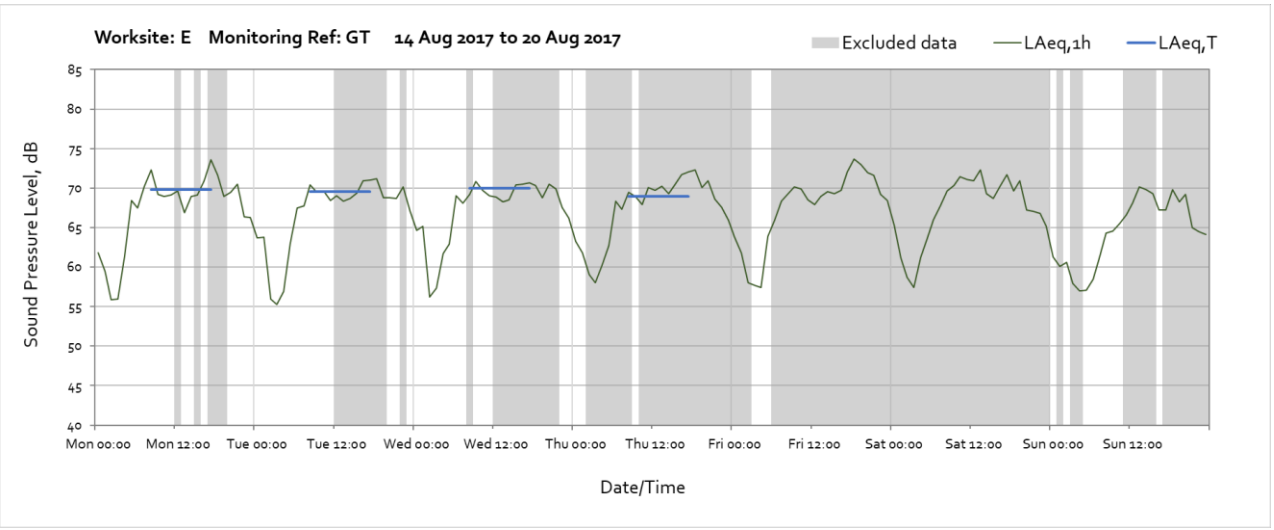
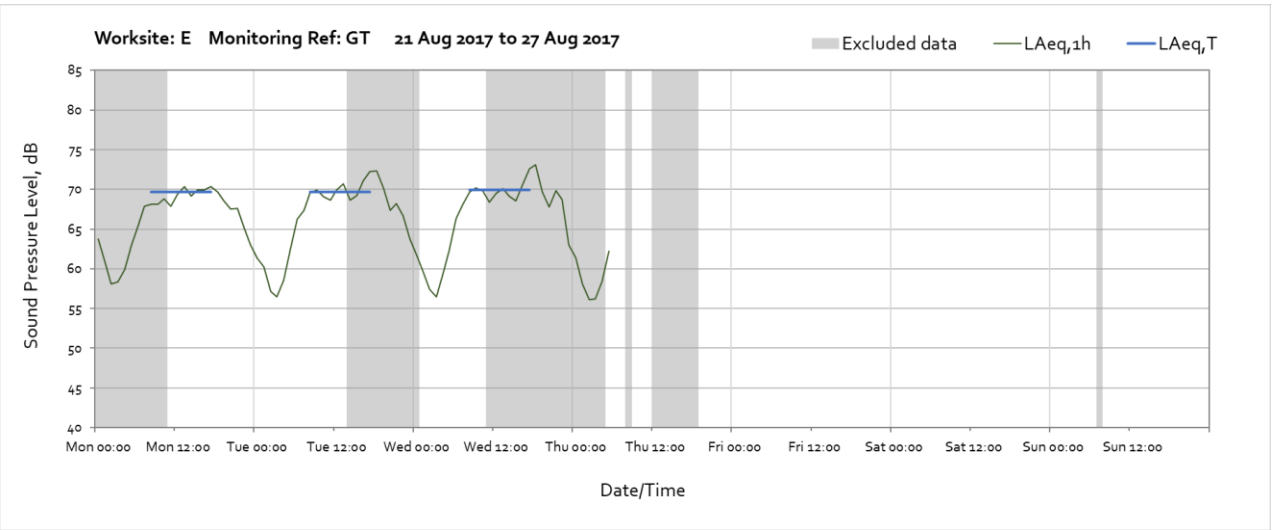
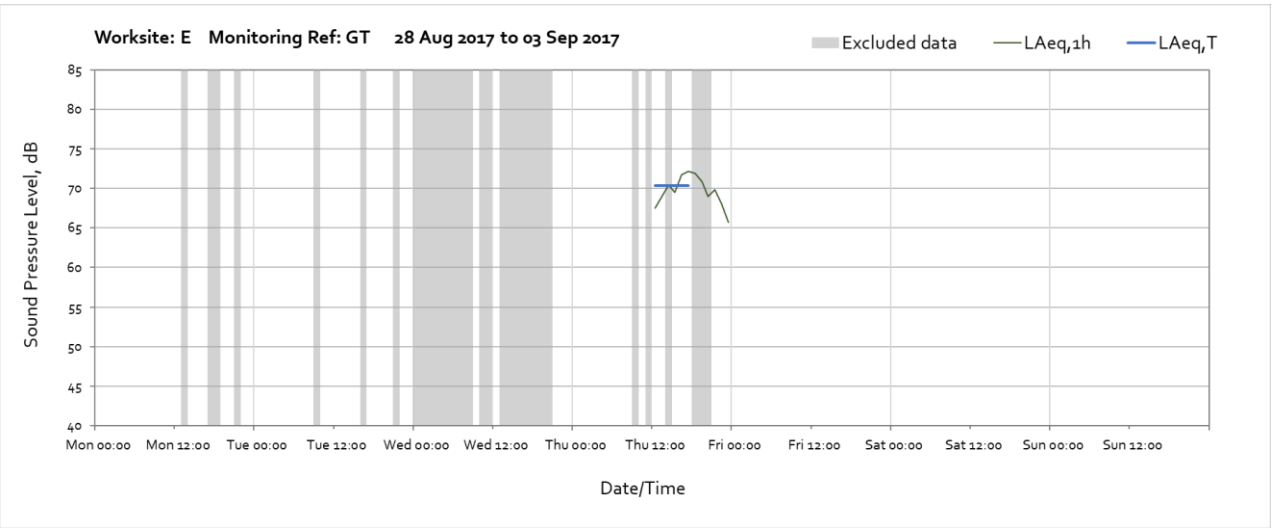
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time





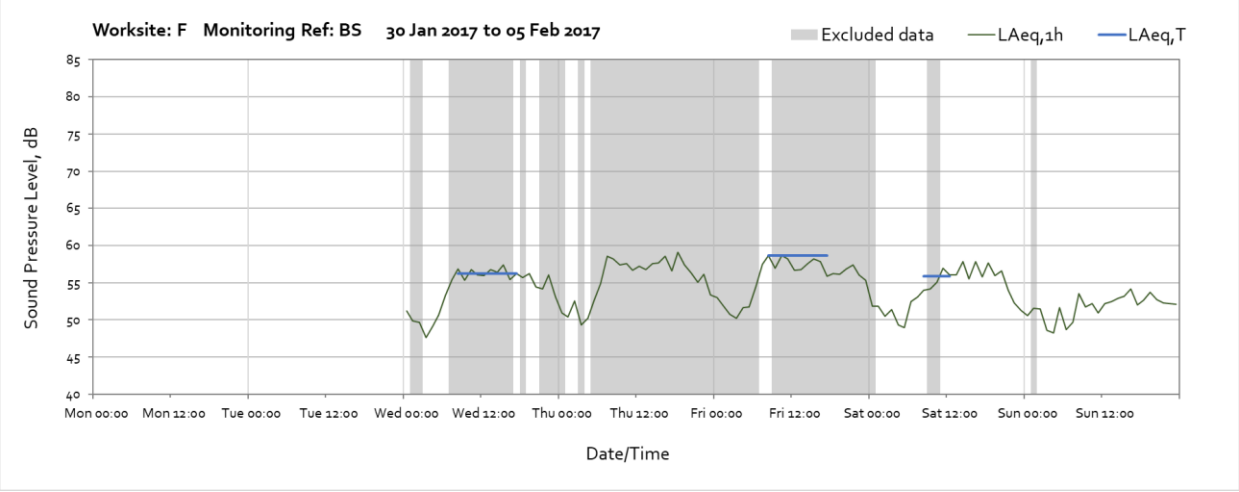


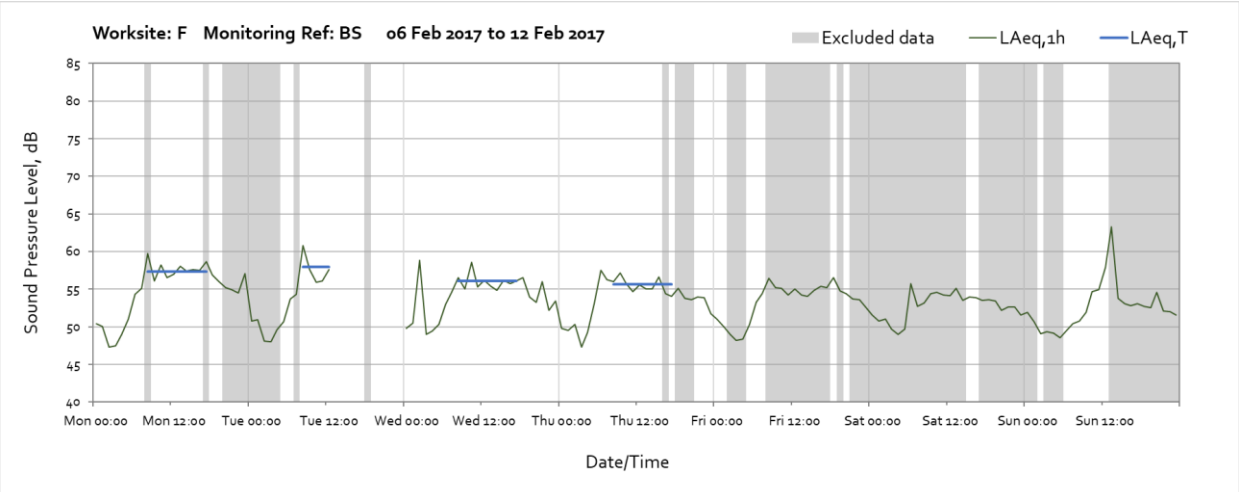
Note – Missing data between 06:00 on Thursday 24th and 12:00 on Thursday 31st of August due to a loss of power at the noise monitor.



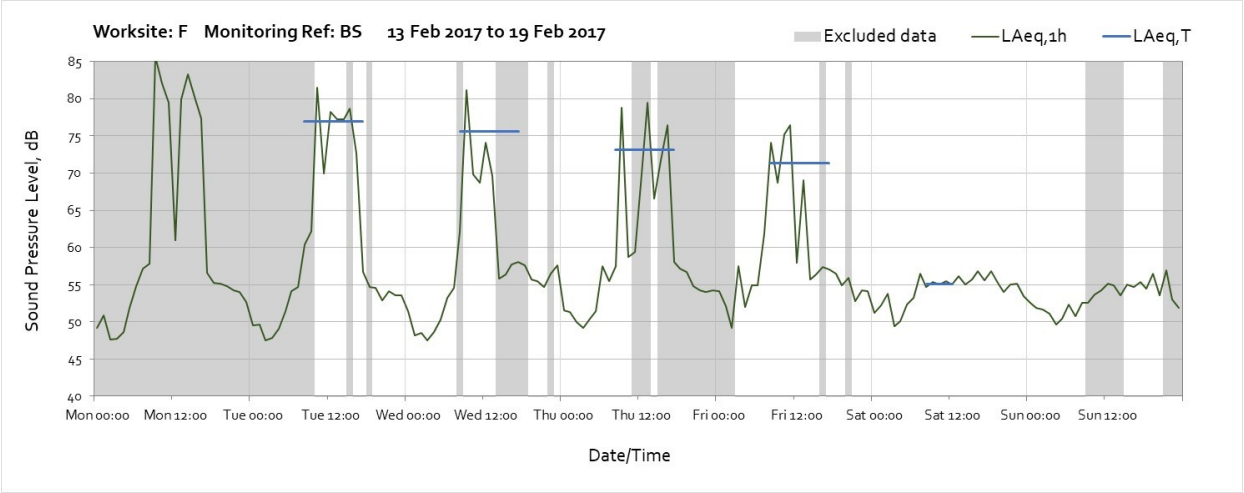
Note – Missing data between 06:00 on Thursday 24th and 12:00 on Thursday 31st of August due to a loss of power at the noise monitor.

Worksite: F – Monitoring Ref: BS





Note – Missing data between 13:00 on Tuesday 7th and 00:00 on Wednesday 8th of February due to a loss of power at the noise monitor.


Worksite: F Monitoring Ref: BS 13 Feb 2017 to 19 Feb 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
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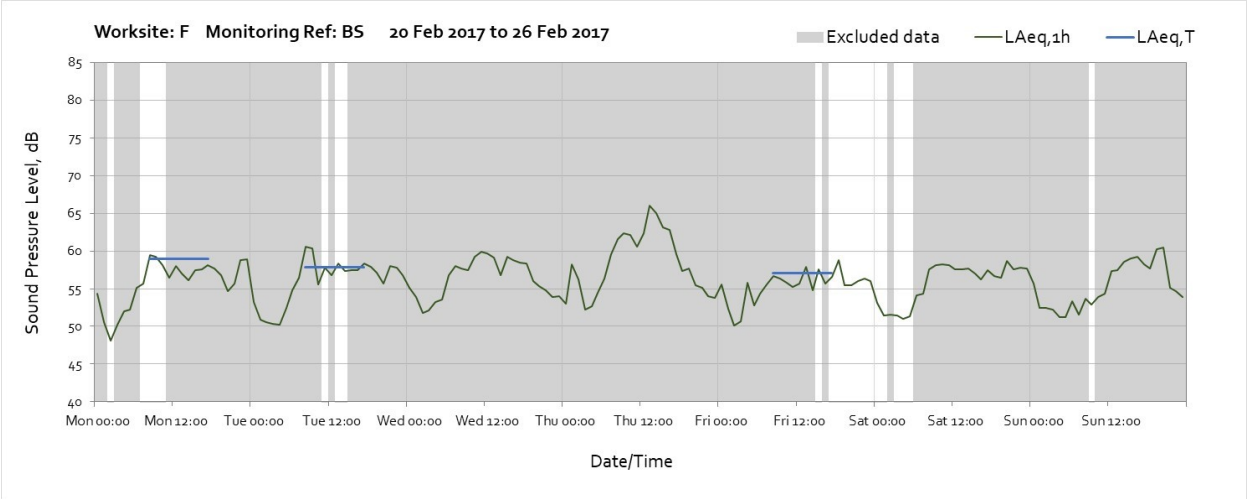
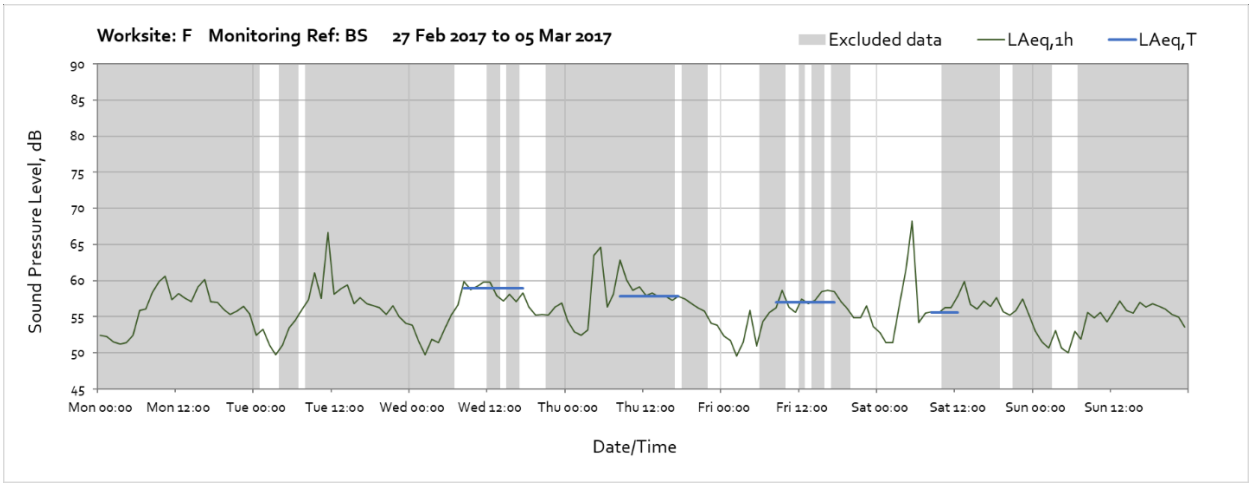
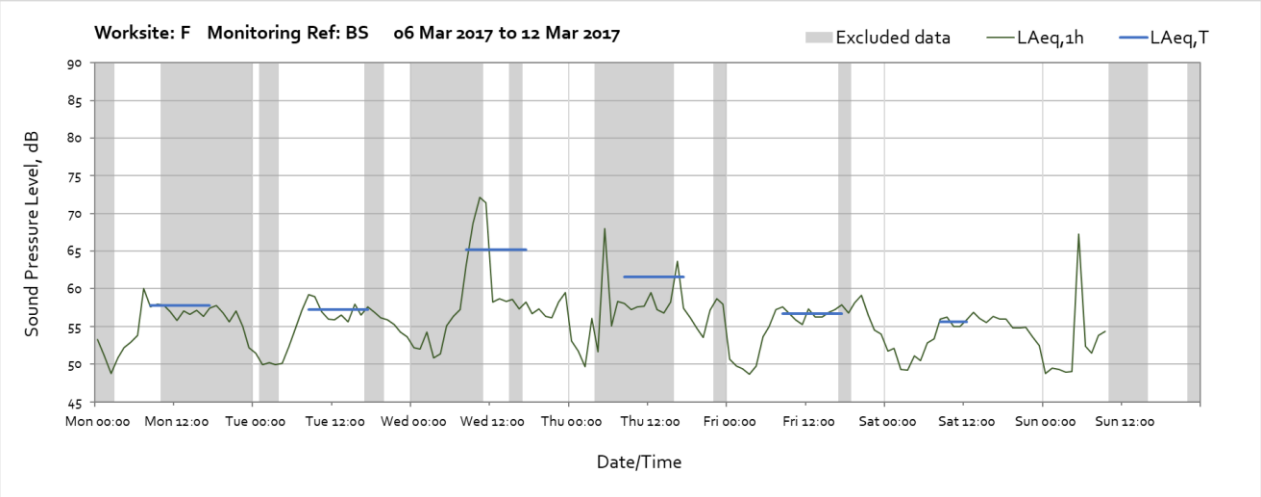
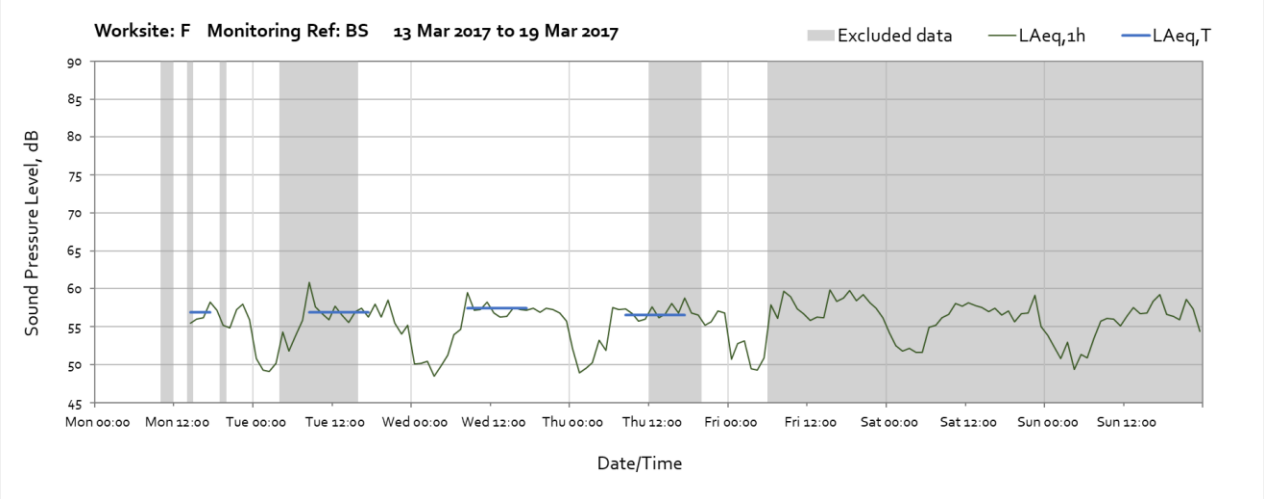
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: F Monitoring Ref: BS 20 Feb 2017 to 26 Feb 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
85
80
75
70
65
60
55
50
45
40
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

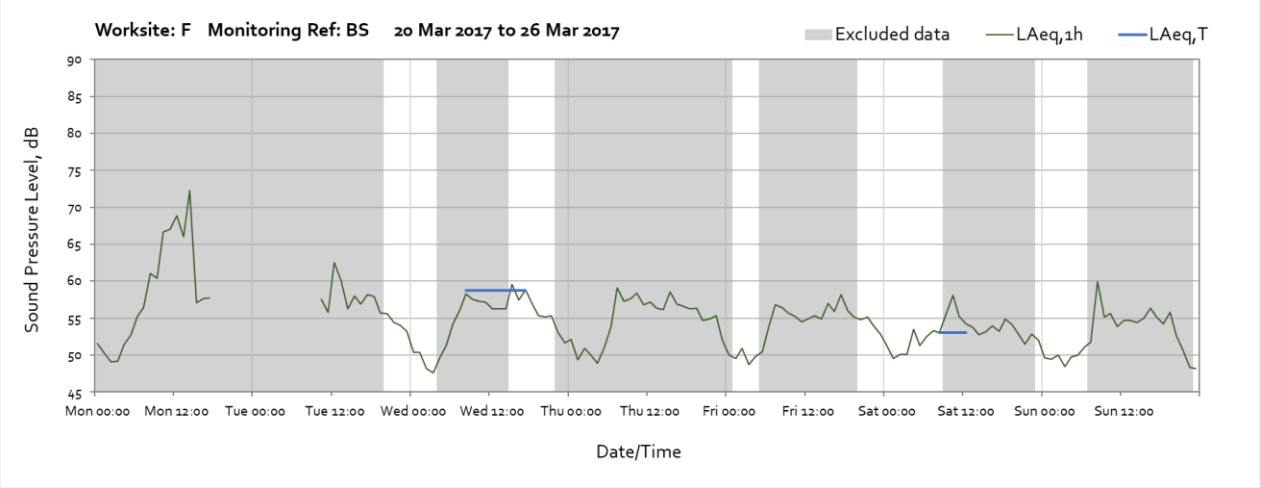

Worksite: F Monitoring Ref: BS 27 Feb 2017 to 05 Mar 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time



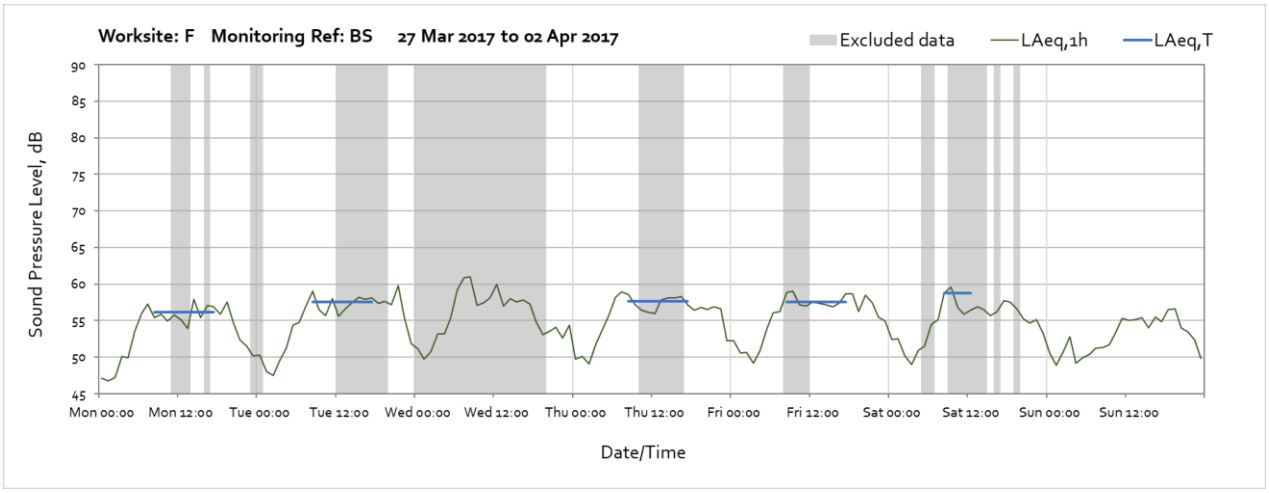
Note – Missing data between 10:00 on Tuesday 12th and 04:00 on Monday 13th of March due to a loss of power at the noise monitor.

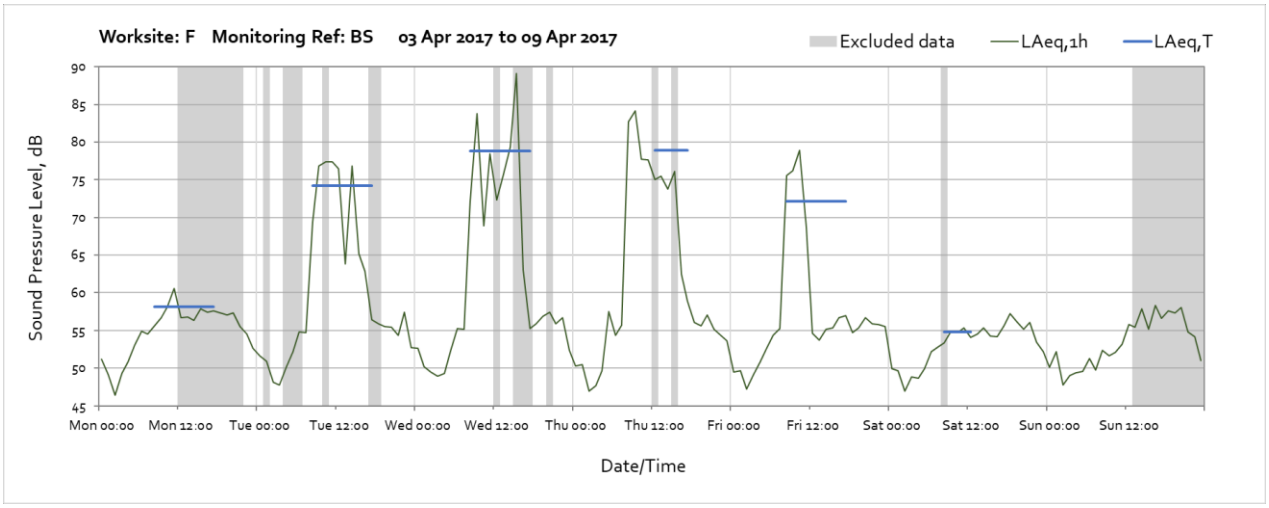


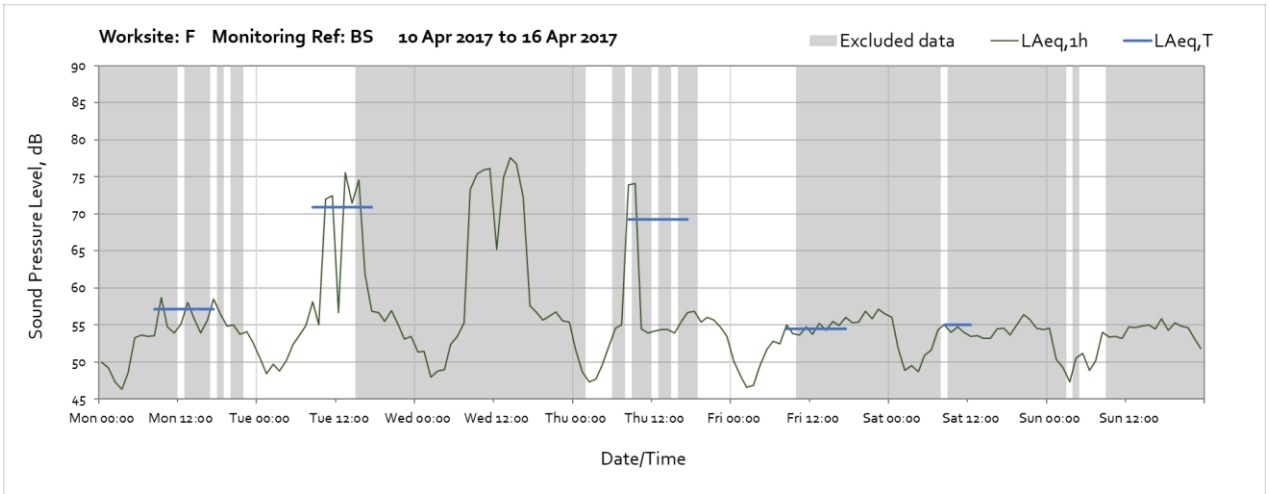
Note – Missing data between 10:00 on Tuesday 12th and 04:00 on Monday 13th of March due to a loss of power at the noise monitor.



Note – Missing data between 18:00 on Monday 20th and 10:00 on Tuesday 21st of March due to a loss of power at the noise monitor.


Worksite: F Monitoring Ref: BS 27 Mar 2017 to 02 Apr 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: F Monitoring Ref: BS 03 Apr 2017 to 09 Apr 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
Fri 00:00
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time


Worksite: F Monitoring Ref: BS 10 Apr 2017 to 16 Apr 2017
Excluded data
LAeq,1h
LAeq,T
Sound Pressure Level, dB
90
85
80
75
70
65
60
55
50
45
Mon 00:00
Mon 12:00
Tue 00:00
Tue 12:00
Wed 00:00
Wed 12:00
Thu 00:00
Thu 12:00
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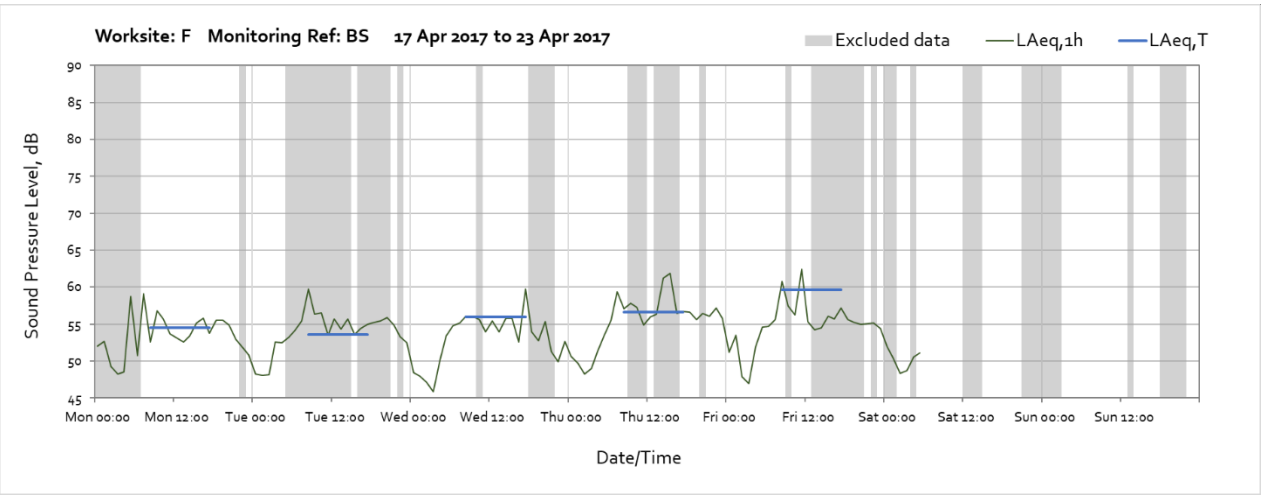
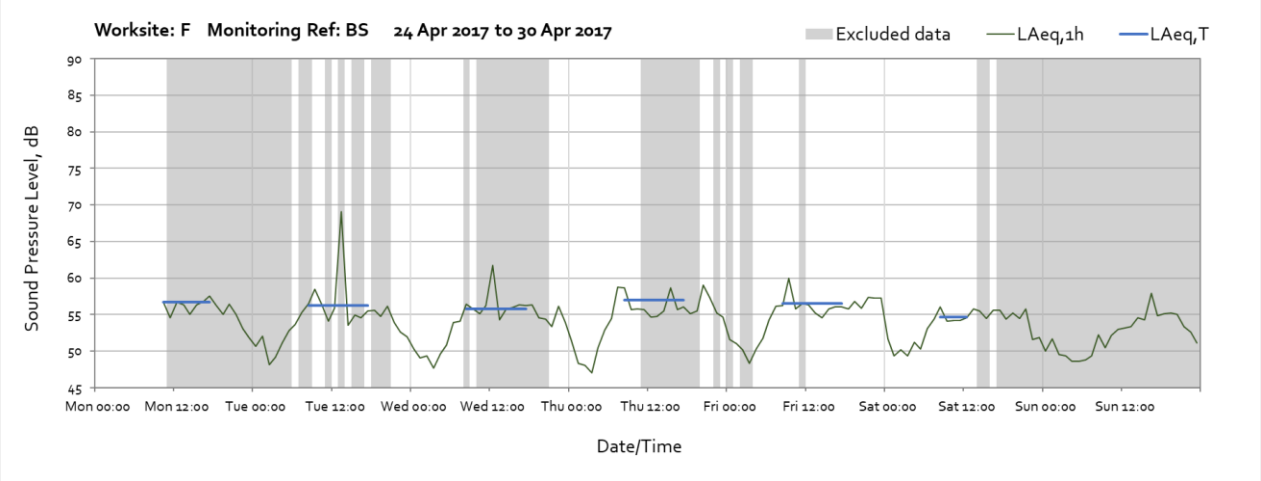
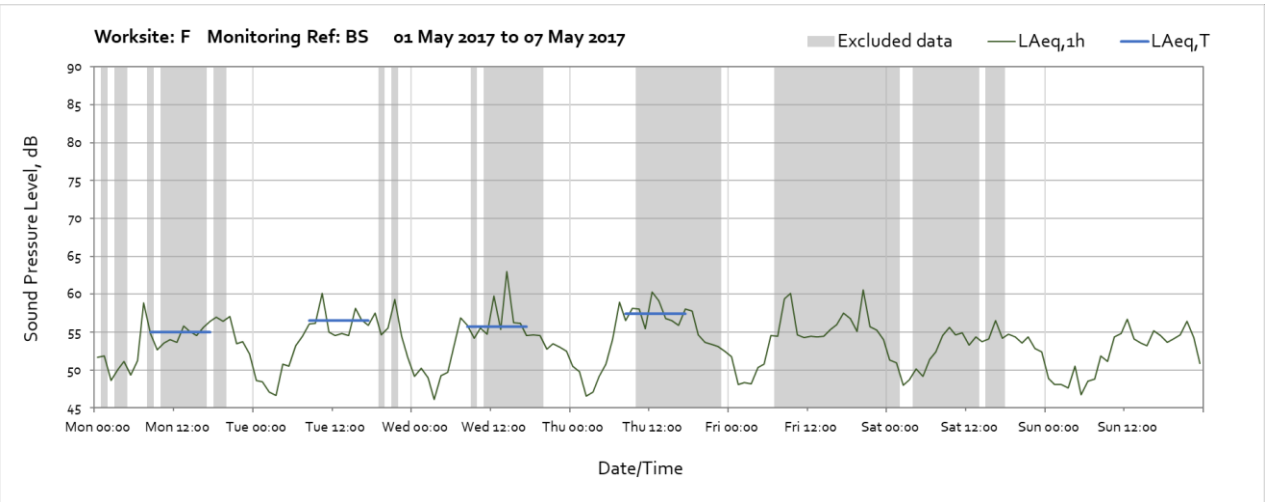
Fri 12:00
Sat 00:00
Sat 12:00
Sun 00:00
Sun 12:00
Date/Time

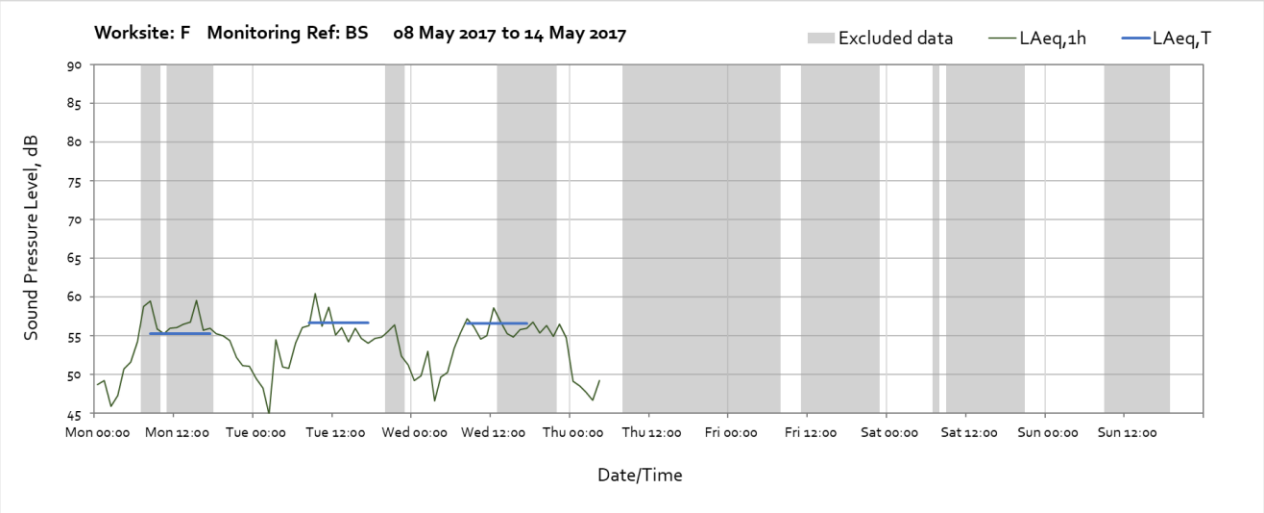


Note – Missing data between 06:00 on Saturday 22nd and 10:00 on Monday 24th of April due to a loss of power at the noise monitor.

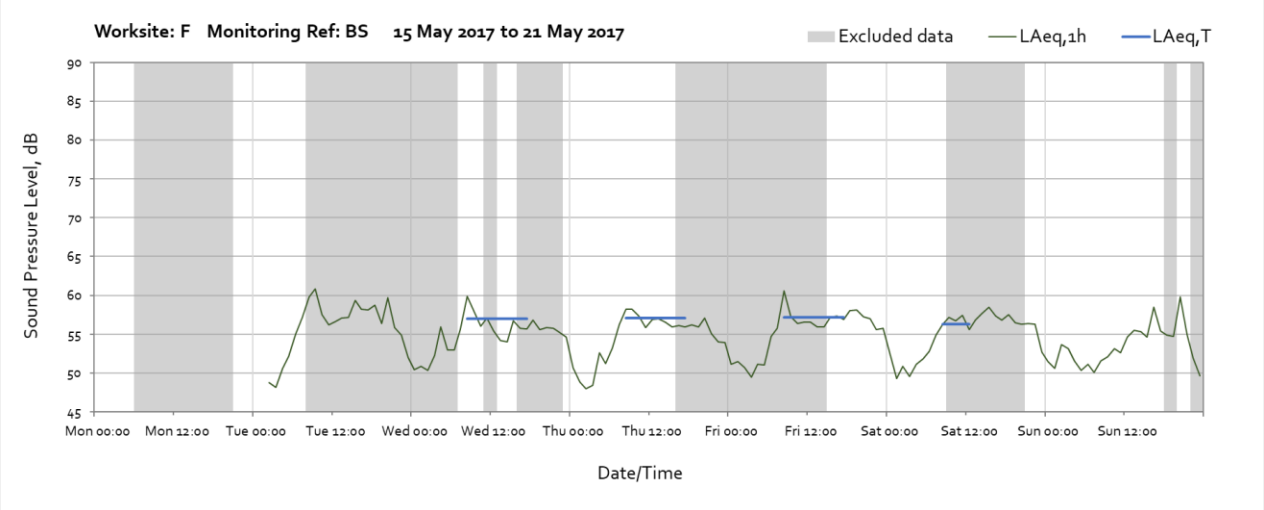


Note – Missing data between 06:00 on Saturday 22nd and 10:00 on Monday 24th of April due to a loss of power at the noise monitor.

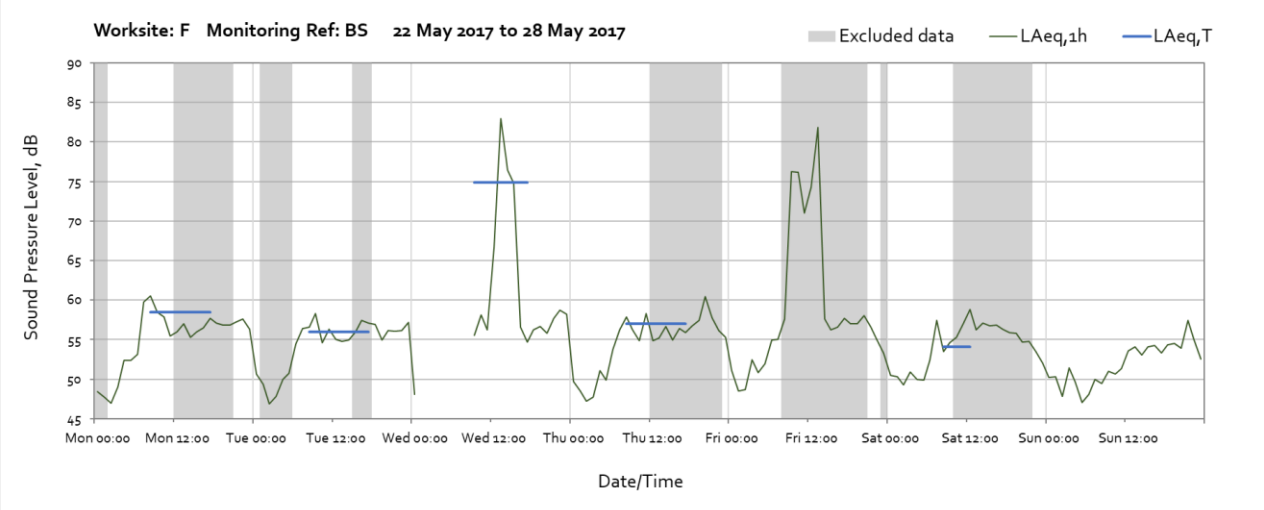




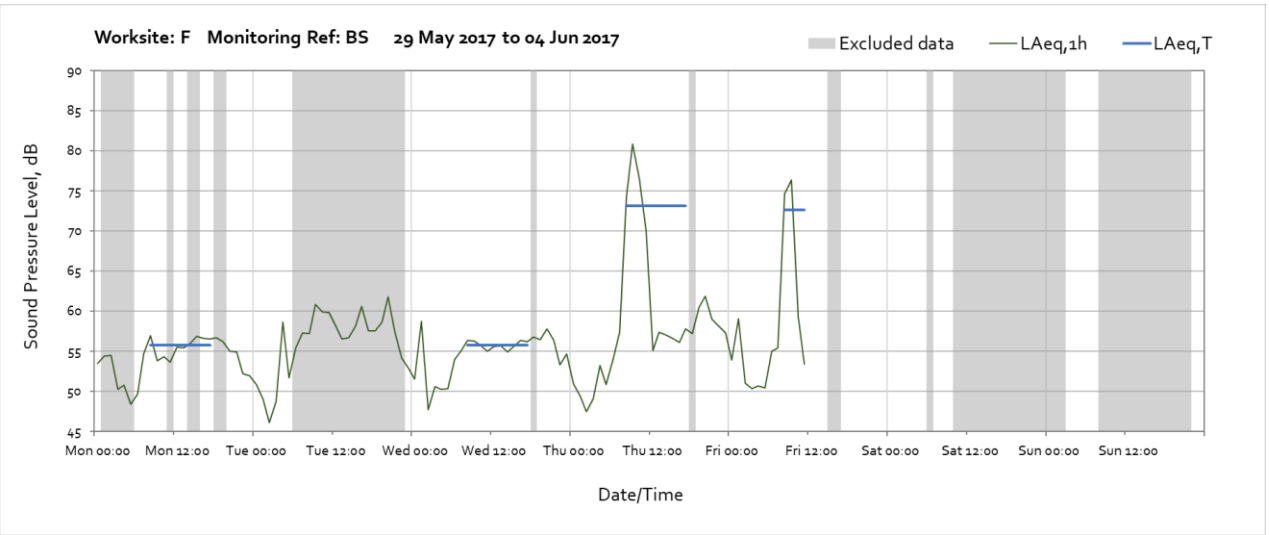
Note – Missing data between 05:00 on Thursday 11th and 02:00 on Tuesday 16th of May due to a loss of power at the noise monitor.



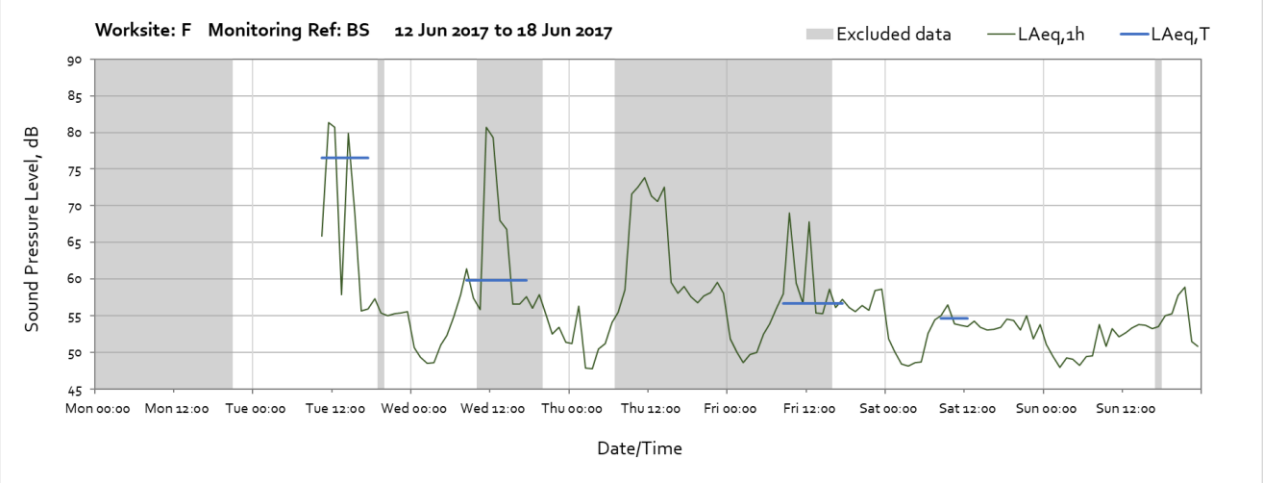
Note – Missing data between 05:00 on Thursday 11th and 02:00 on Tuesday 16th of May due to a loss of power at the noise monitor.



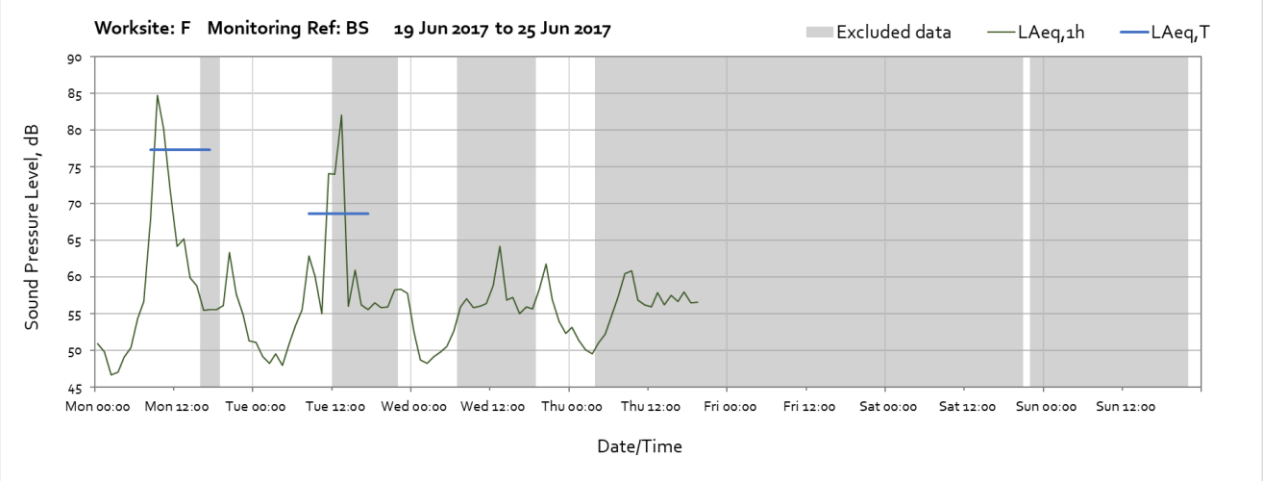
Note – Missing data between 01:00 and 09:00 on Wednesday 24th of May due to a loss of power at the noise monitor.



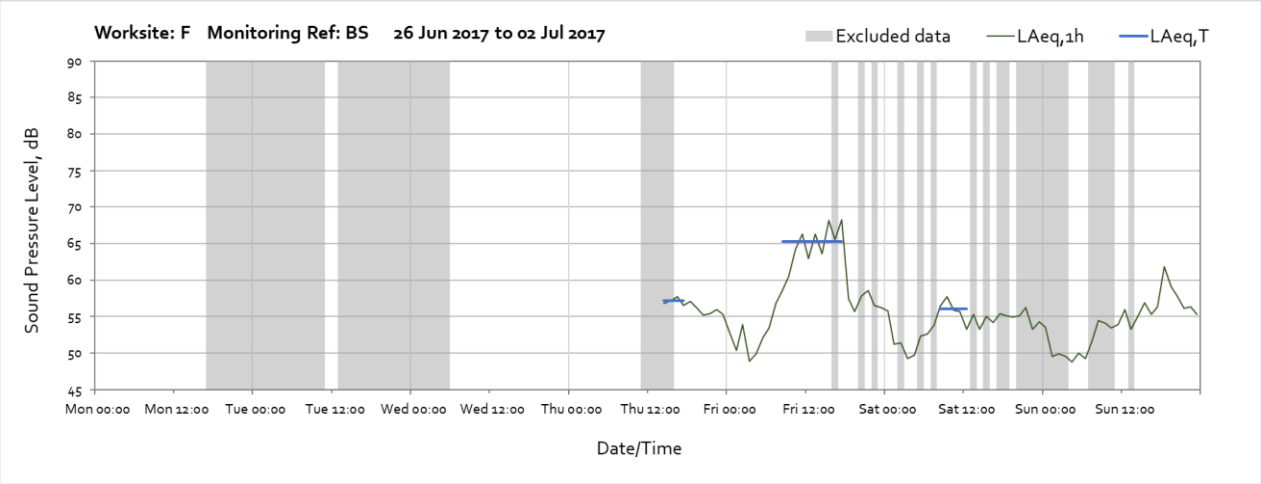
Note – Missing data between 12:00 on Friday 2nd and 10:00 on Tuesday 13th of June due to a loss of power at the noise monitor.



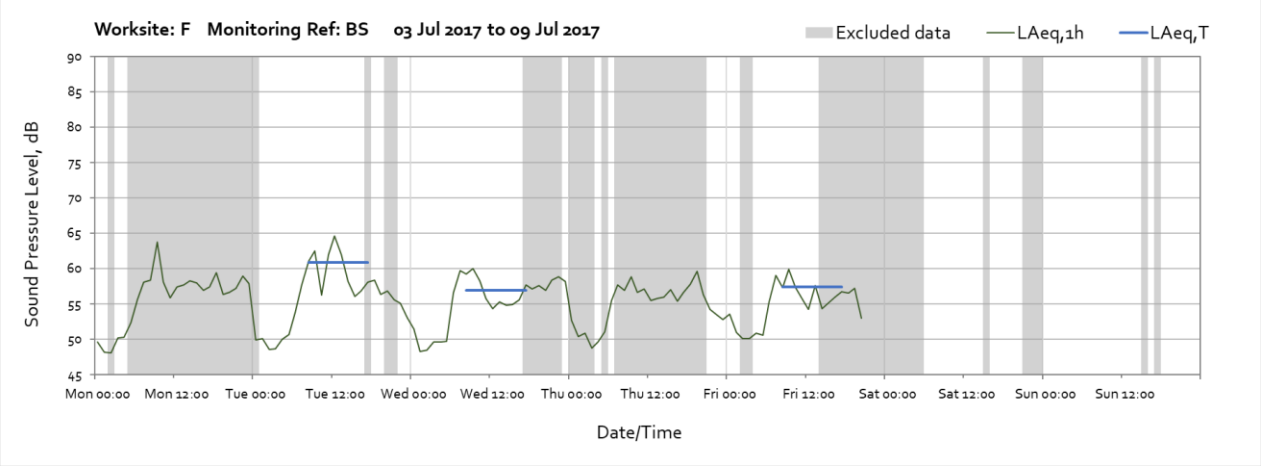
Note – Missing data between 12:00 on Friday 2nd and 10:00 on Tuesday 13th of June due to a loss of power at the noise monitor.



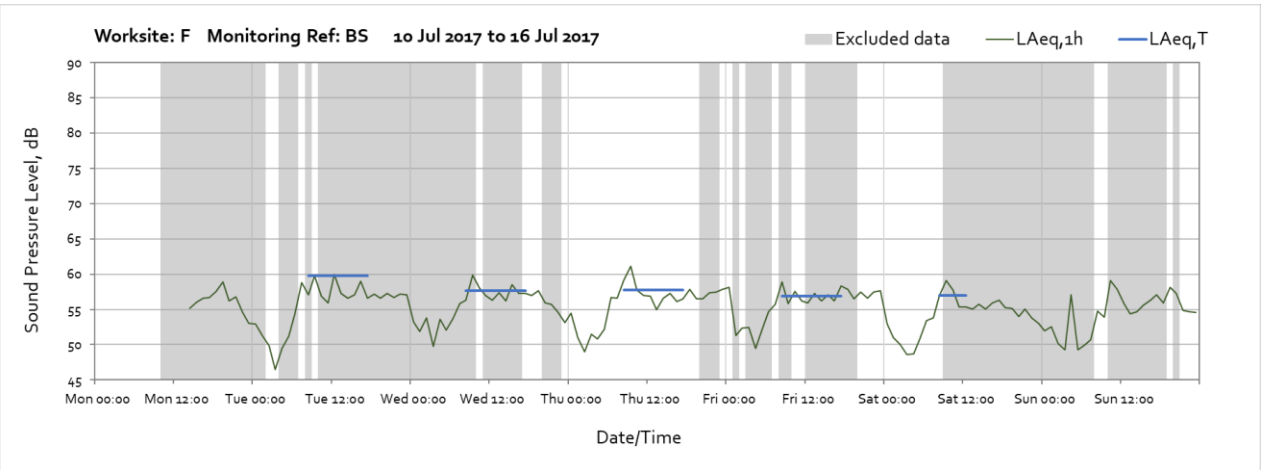
Note – Missing data between 20:00 on Thursday 22nd and 14:00 on Thursday 29th of June due to a loss of power at the noise monitor.



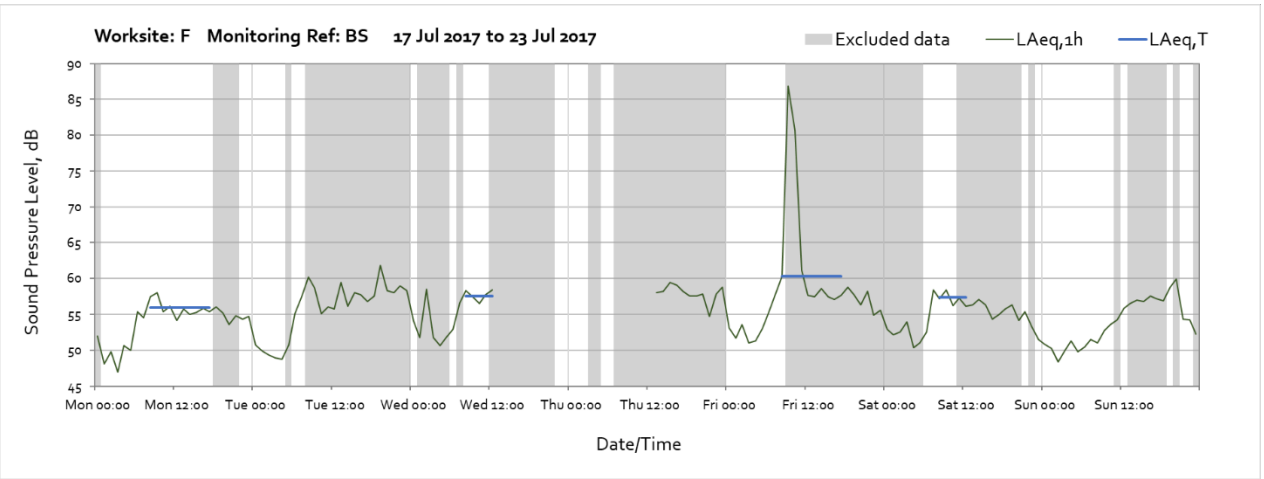
Note – Missing data between 20:00 on Thursday 22nd and 14:00 on Thursday 29th of June due to a loss of power at the noise monitor.



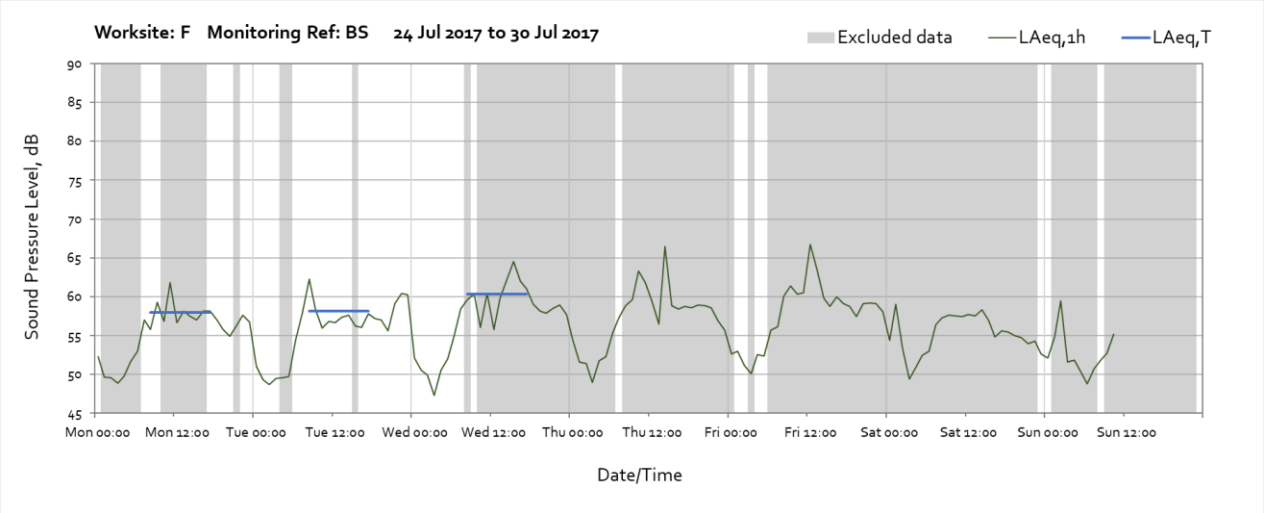
Note – Missing data between 21:00 on Friday 7th and 14:00 on Monday 10th of July due to a loss of power at the noise monitor.



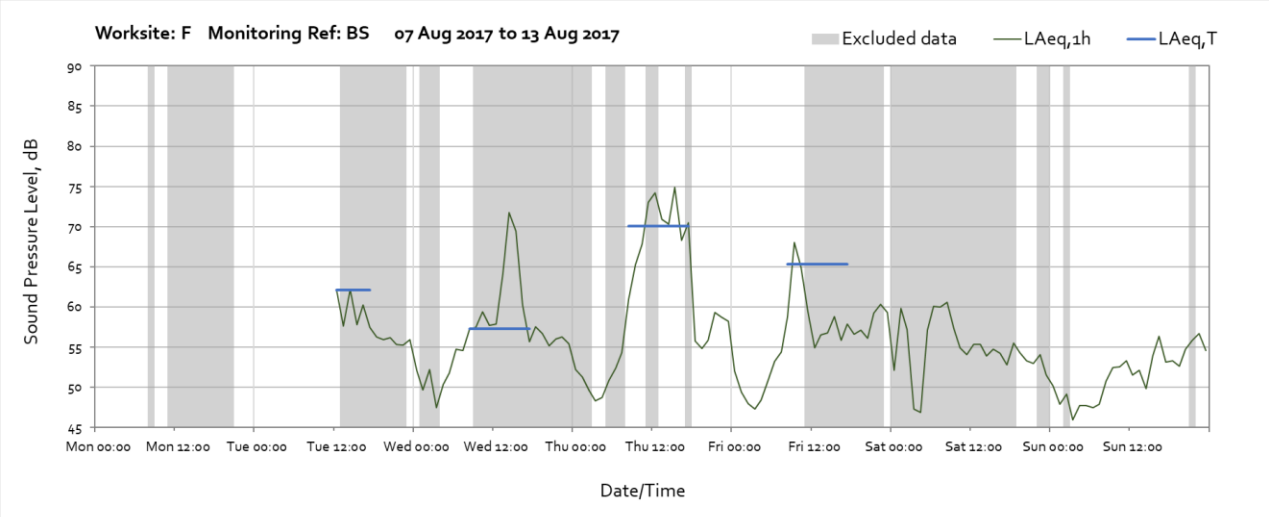
Note – Missing data between 21:00 on Friday 7th and 14:00 on Monday 10th of July due to a loss of power at the noise monitor.



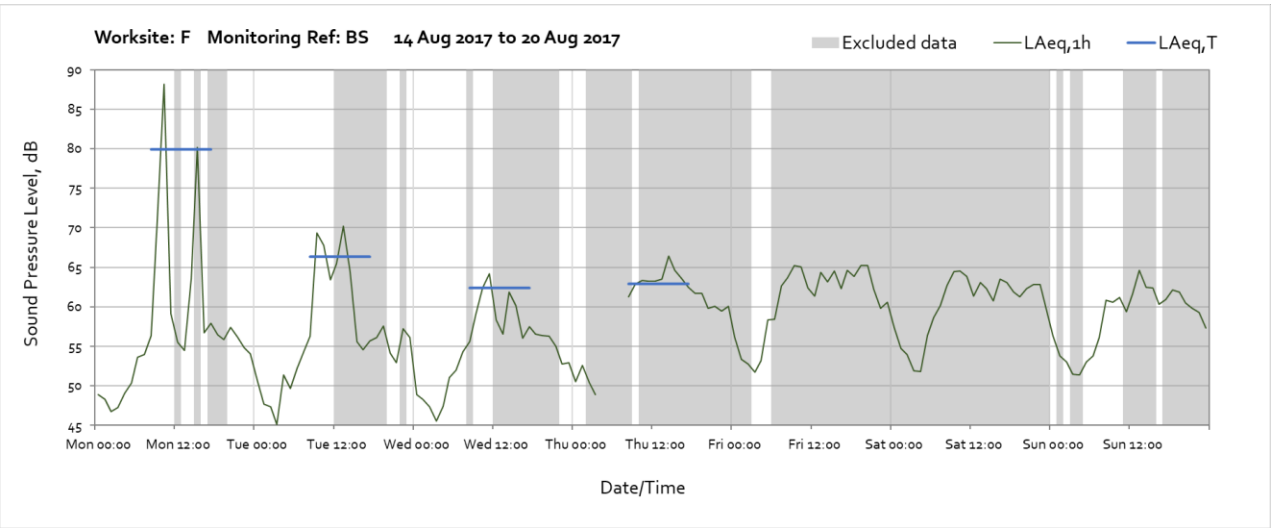
Note – Missing data between 13:00 on Wednesday 19th and 13:00 on Thursday 20th of July due to a loss of power at the noise monitor.



Note – Missing data between 11:00 on Sunday 30th of July and 12:00 on Tuesday 8th of August due to a loss of power at the noise monitor.



Note – Missing data between 11:00 on Sunday 30th of July and 12:00 on Tuesday 8th of August due to a loss of power at the noise monitor.



Note – Missing data between 04:00 and 08:00 on Thursday 17th of August due to a loss of power at the noise monitor.